Ural Federal University

named after the first President of Russia B.N.Yeltsin

DOCTORAL PROGRAMS

- CHEMICAL ENGINEERING
- PHYSICS AND CHEMICAL TECHNOLOGIES
- COMPUTER SCIENCE AND ENGINEERING
- INFORMATION TECHNOLOGIES AND CAD SYSTEMS
- ELECTRICAL ENERGY AND THERMAL POWER ENERGY
- MACHINE-BUILDING TECHNOLOGY
- WELDING TECHNOLOGIES
- LIFTING APPLIANCE AND ROBOTS
- MATERIALS TECHNOLOGY
- MATERIALS SCIENCE

CONTENTS

High-quality education has always been of value; today it remains an important asset all over the globe. The level of development of the country is directly dependent on the level of scientific cognition of the nature and the society, as well as on the broad use of scientific achievements in engineering and technology. Thus the need for specialists with experience in research will only grow in the years to come.

We invite all researchers interested in the mysteries of the Universe and the organic and inorganic nature, the development of technology, economic and social spheres of life, to pursue their doctoral studies at Ural Federal University. Being one of the leading Russian universities in terms of research activities, Ural Federal University possesses all necessary facilities for doctoral students to pursue their studies in such fields as Natural Sciences, Mathematics, Engineering, Human Sciences, and Economics. Scientific advisors working with doctoral students have broad experience of working in the leading universities of the world.

Vladimir Kruzhaev,
UrFU Vice-rector
for Research

INSTITUTE OF CHEMICAL ENGINEERING

The Institute of Chemical Engineering is one of the leading academic units at Ural Federal University. Competitive advantages of the Institute are related to its great history, scientific and educational traditions, as well as to the highly qualified staff members having extensive experience in solving the fundamental and applied problems in modern chemistry and chemical technology.

The most important priority of the Institute is to provide favorable conditions for the formation of a free-thinking creative personality capable to develop scientific, engineering and worldview decisions under the conditions of the continuous changes in the needs of society, research and industry.

The Institute offers a range of Doctoral Programs supervised by the leading scientists having wide experience of work in Russian and foreign universities.

We are looking forward to seeing you in the institute team!

Dr. Vladimir Rusinov,
Director of the Institute

ABOUT THE INSTITUTE

Ural Federal University
named after the first President of Russia B.N.Yeltsin
Institute of Chemical Engineering

The Institute of Chemical Engineering was founded in 1920. The staff of the Institute includes more than 100 academics and scientific researchers.

Today the Institute is actively working in the fields of organic, physical, medical chemistry; electrochemistry; immunochemistry; chemical technology of organic and inorganic substances; fuel and high-energy materials; electrochemical industry; single crystals, processes; machines and devices of chemical productions. The institute has excellent facilities to perform research in a professional manner; the staff members are publishing the results of their scientific research in top world journals, and are actively working on government contracts, grants and other projects of the various levels.

The secret of the Institute's success is in its scientific schools implementing breakthrough research, its open attitude towards the external environment and the extensive support it provides to young talented researchers to help them in implementing their ideas.

DOCTORAL STUDIES AT THE ICE

UrFU Institute of Chemical Engineering offers a range of Doctoral Programs in the fields of Chemistry and Chemical Technology. Herein, one can find a brief description of the programs, along with the information about the thesis scientific advisors.

We offer:

- 4 year Doctoral Programs.
- Accommodation in a university dormitory.
- The possibility to be employed as a researcher in the group of the scientific advisor.
- Free Russian language courses.
- The possibility to defend the PhD thesis.

General entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian (B2).
- Interview.

For further information, please contact:

Dr. Mikhail V. Varaksin,
Deputy Director for Science
m.v.varaksin@urfu.ru

ATOM-EFFICIENT METHODOLOGIES IN ORGANIC CHEMISTRY. SYNTHESIS OF COMPOUNDS POSSESSING ANTI-INFECTIOUS ACTIVITY

Department of Organic and Biomolecular Chemistry

Fundamental and applied research in the field of heterocyclic compounds functionalization using atom-efficient approaches. Synthesis of organic substances possessing anti-infectious activity.

Dr. Oleg Chupakhin
Professor

chupakhin@ios.uran.ru

Research interests:

- Organic synthesis.
- Heterocyclic compounds.
- C-H Functionalization methodology.
- Green chemistry.
- Ligands.
- Biological activity.

Main publications:

- *Charushin V., Chupakhin O.* Metal Free C-H Functionalization of Aromatics. Nucleophilic Displacement of Hydrogen // Topics in Heterocyclic Chemistry / eds. Maes B. U. W.; Cossy J; Polanc S., Eds. Springer: Switzerland, 2014. V. 37. 283 p. DOI: 10.1007/978-3-319-07019-3
- *Verbitskiy E. V., Cheprakova E. M., Slepukhin P. A., Kravchenko M. A., Skornyakov S. N., Rusinov G. L., Chupakhin O. N., Charushin V. N.* Synthesis, and structure-activity relationship for C(4) and/or C(5) thienyl substituted pyrimidines, as a new family of antimycobacterial compounds // European Journal of Medicinal Chemistry. 2015. V. 97. Art. no. 7886. P. 225–234. DOI: 10.1016/j.ejmech.2015.05.007

Entry requirements:

- Good knowledge in organic and medicinal chemistry, methods for identification of organic compounds.
- Fluent in English or Russian.
- Good synthetic skills.

ATOM-EFFICIENT METHODOLOGIES IN ORGANIC CHEMISTRY. SYNTHESIS OF COMPOUNDS POSSESSING ANTIBACTERIAL ACTIVITY

Department of Organic and Biomolecular Chemistry

Fundamental and applied research in the field of heterocyclic compounds functionalization using atom-efficient approaches. Synthesis of organic substances possessing antibacterial activity.

Dr. Valery Charushin
Professor

charushin@ios.uran.ru

Research interests:

- Organic synthesis.
- Heterocyclic compounds.
- C-H Functionalization methodology.
- Green chemistry.
- Ligands.
- Biological activity.

Main publications:

- *Charushin V., Chupakhin O.* Metal Free C-H Functionalization of Aromatics. Nucleophilic Displacement of Hydrogen. In the series Topics in Heterocyclic Chemistry / eds. Maes B. U. W.; Cossy J; Polanc S. Springer: Switzerland, 2014. V. 37. 283 p. DOI: 10.1007/978-3-319-07019-3
- *Lipunova G. N., Nosova E. V., Charushin V. N., Chupakhin O. N.* Fluorine-containing pyrazoles and their condensed derivatives: Synthesis and biological activity // Journal of Fluorine Chemistry. 2015. V. 175. P. 84–109. DOI: 10.1016/j.jfluchem.2015.03.011

Entry requirements:

- Good knowledge in organic and medical chemistry, methods for identification of organic compounds.
- Fluent in English or Russian.
- Good synthetic skills.

ATOM-EFFICIENT METHODOLOGIES IN ORGANIC CHEMISTRY. SYNTHESIS OF COMPOUNDS POSSESSING ANTIVIRAL ACTIVITY

Department of Organic and Biomolecular Chemistry

Fundamental and applied research in the field of heterocyclic compounds functionalization using atom-efficient approaches. Synthesis of organic substances possessing anti-viral activity.

Dr. Vladimir Rusinov
Professor

v.l.rusinov@urfu.ru

Research interests:

- Organic synthesis.
- Heterocyclic compounds.
- C-H Functionalization methodology.
- Green chemistry.
- Ligands.
- Biological activity.

Main publications:

- *Rusinov V. L., Sapozhnikova I. M., Ulomskii E. N., Medvedeva N. R., Egorov V. V., Kiselev O. I., Deeva E. G., Vasin A. V., Chupakhin O. N.* Nucleophilic substitution of nitro group in nitrotriazolotriazines as a model of potential interaction with cysteine-containing proteins // Chemistry of Heterocyclic Compounds. 2015. V. 51 (3). P. 275–280.
  DOI: 10.1007/s10593-015-1695-4
- *Khalymbadzha I. A., Shestakova T. S., Subbotina J. O., Eltsov O. S., Musikhina A. A., Rusinov V. L., Chupakhin O. N., Karpenko I. L., Jasko M. V., Kukhanova M. K., Deev S. L.* Synthesis of acyclic nucleoside analogues based on 1,2,4-triazolo[1,5-a]pyrimidin-7-ones by one-step Vorbrüggen glycosylation // Tetrahedron. 2014. V. 70 (6). P. 1298–1305.
  DOI: 10.1016/j.tet.2013.12.051

Entry requirements:

- Good knowledge in organic and medicinal chemistry, methods for identification of organic compounds.
- Fluent in English or Russian.
- Good synthetic skills.

ATOM-EFFICIENT METHODOLOGIES IN ORGANIC SYNTHESIS

Department of Organic and Biomolecular Chemistry

Synthesis of new organic functional materials, chemosensors, and bioactive compounds.

Dr. Grigoriy Zyryanov

gvzyryanov@gmail.com

Research interests:

- Synthetic organic and biomolecular chemistry.
- Highly reactive organic intermediates.
- Photoluminescent detection of bioactive compounds and technogenic waists.
- Photochemistry.

Main publications:

- *Palacios M. A., Wang Z., Montes V. A., Zyryanov G. V., Anzenbacher Jr. P.* Rational design of a minimal size sensor array for metal ion detection // Journal of American Chemical Society. 2008. V. 130. P. 10307–10314. DOI: 10.1021/ja802377k
- *Zyryanov G. V., Palacios M. A., Anzenbacher Jr. P.* Rational design of a fluorescence-turn-on sensor array for phosphates in blood serum // Angewandte Chemie International Edition. 2007. V. 46. P. 7849–7852. DOI: 10.1002/anie.200702611
- *Zyryanov G. V., Palacios M. A., Anzenbacher Jr. P.* Simple molecule-based fluorescent sensors for vapor detection of TNT // Organic Letters. 2008. V. 10 (17). P. 3681–3684. DOI: 10.1021/ol801030u
- *Kopchuk D. S., Nikonov I. L., Zyryanov G. V., Nosova E. V., Kovalev I. S., Slepukhin P. A., Rusinov V. L., Chupakhin O. N.* Aryne approach towards 2,3-difluoro-10-(1H-1,2,3-triazol-1-yl)pyrido[1,2-a]indoles // Mendeleev Communications. 2015. V. 25 (1). P. 13–14. DOI: 10.1016/j.mencom.2015.01.003

Entry requirements:

- Good knowledge in organic or applied chemistry.
- Fluent in English or Russian.
- Good synthetic and analytical skills.
- Knowledge in physical and chemical methods of composition interpretation.

IMMUNOCHEMISTRY, BIOCHEMISTRY AND IMMUNOBIOTECHNOLOGY

Department of Immunochemistry

Development of scientific research in the field of immunochemistry, biochemistry, immunobiotechnology, and implementation of their results in practice.

Dr. Valery Chereshnev
Professor

chereshnev@duma.gov.ru

Research interests:

- Development of test systems for immunochemical analysis methods in medicine, pharmacy, biotechnology.
- Study of the biochemical and immunological mechanisms in the development of experimental pathology and search of ways of their pharmacological correction.
- Development of theoretical bases of biotechnology immunobiological preparations.

Main publications:

- *Gankovskaya L. V., Svitich O. A., Chereshnev V. A., Karaulov A. V., Chereshneva M. V., Guseva M. R., Gavrilova T. V., Grechenko V. V., Miroshnichenkova A. M., Zverev V. V.* Diverse Expression of Toll-Like Receptor-9 and β-Defensin-2 in Corneal Cells during Herpes Simplex Virus-1 Keratitis // International Trends in Immunity. 2014. V. 2 (3). P. 128–133.
  HTTP://researchpub.org/journal/iti/number/vol2-no3/vol2-no3-5.pdf
- *Baeva T. A., Gein S. V., Kuyukina M. S., Ivshina I. B., Kochina O. A., Chereshnev V. A.* Effect of Glycolipid Rhodococcus Biosurfactant on Secretory Activiti of Neutrophils In Vitro // Bulletin of Experimental Biology and Medicine. 2014. V. 157 (2). P. 238–242.
  DOI: 10.1007/s10517-014-2534-9

Entry requirements:

- University degree in chemistry, biology, biotechnology, pharmacy.
- Research experience in these areas.
- Knowledge of the methods used in immunology, molecular genetics, genetic engineering, proteomics, separation and purification of biopolymers is recommended.
- Fluent in English or Russian.

ORGANIC CHEMISTRY

Department of Technology for Organic Synthesis

Research in the area of organic chemistry, synthesis of five-membered heterocyclic compounds based on the reaction of azides, enamines and thioamides.

Dr. Vasiliy Bakulev
Professor

v.a.bakulev@urfu.ru

Research interests:

- Organic chemistry.
- Heterocyclic compounds.
- Biological activity.

Main publications:

- *Tkachov R., Karpov Y., Senkovskyy V., Raguzin I., Zessin J., Lederer A., Stamm M., Voit B., Beryozkina T., Bakulev V., Zhao W., Facchetti A., Kiriy A.* Efficient Tin-Free Route to a Donor–Acceptor Semiconducting Copolymer with Variable Molecular Weights // Macromolecules. 2014. V. 47 (12). P. 3845–3851. DOI: 10.1021/ma5007667
- *Tkachov R., Senkovskyy V., Beryozkina T., Boyko K., Bakulev V., Lederer A., Sahre K., Voit B., Kiriy A.* Palladium-catalyzed chain-growth polycondensation of AB-type monomers: high catalyst turnover and polymerization rates // Angewandte Chemie International Edition. 2014. V. 53 (9). P. 2402–2407. DOI: 10.1002/anie.201310045
- *Efimov I., Bakulev V., Beliaev N., Beryozkina T., Knippschild U., Leban J., Zhi-Jin F., Eltsov O., Slepukhin P., Ezhikova M., Dehaen W.* Reactions of β-Azolylenamines with Sulfonyl Azides as an Approach to N-Unsubstituted 1,2,3-Triazoles and Ethene-1,2-diamines // European Journal of Organic Chemistry. 2014. P. 3684–3689. DOI: 10.1002/ejoc.201402130
- *Beryozkina T. V., Zhidovinov S. S., Shafran Y. M., Eltsov O. S., Slepukhin P. A., Leban J., Marquez J., Bakulev V. A.* Self-condensation of b-(isoxazol-5-yl) enamines under treatment with acetyl chloride and acids. Synthesis of novel 1, 3-diisoxazolyl- 1,3-dieneamines and 1,3,5-triisoxazolyl benzenes // Tetrahedron. 2014. V. 70. P. 3915–3923. DOI: 10.1002/chin.201441141

Entry requirements:

- Good knowledge of organic chemistry within university program.
- Fluent in English or Russian.

SUPRAMOLECULAR CHEMISTRY, ANALYTICAL CHEMISTRY

Department of Technology for Organic Synthesis

The program focuses on the synthesis and the investigation of the properties of calixarenes, liquid extraction of f- and d- elements.

Dr. Yuri Morzherin
Professor

Yu.yu.morzherin@urfu.ru

Research interests:

- Calixarenes.
- Extraction.
- Complex compounds.

Main publications:

- *Shevyrin V., Melkozerov V., Nevero A., Eltsov O., Shafran Y., Morzherin Y., Lebedev A. T.* Identification and analytical characteristics of synthetic cannabinoids with an indazole-3-carboxamide structure bearing a N -1-methoxycarbonylalkyl group. 2015.
  DOI: 10.1007/s00216-015-8612-7
- *Ivanova E. A., Prokhorova P. E., Mitin V. V., Glukhareva T. V., Morzherin Yu. Yu.* Chlorination of Calix[4]arene Derivatives // Synthetic Communications. 2015. V. 45 (13). P. 1592–1597.
  DOI: 10.1080/00397911.2015.1036452
- *Nein Y. I., Morzherin Y. Y.* Synthesis of [1,2,3]triazolo[1,5-a]pyrazinium-3-olates // Chemistry of Heterocyclic Compounds. 2014. V. 50 (7). 1021–1026.
  DOI: 10.1007/s10593-014-1558-4
- *Obydennov K. L., Klimareva E. L., Kosterina M. F., Slepukhin P. A., Morzherin Y. Y.* Influence of solvent and substituents on the reaction of N-alkylthioacetamides with dimethyl acetylenedicarboxylate: Synthesis of functionalized thiophenes containing an exocyclic double bond // Tetrahedron Letters. 2013. V. 54 (36). P. 4876–4879.
  DOI: 10.1016/j.tetlet.2013.06.127

Entry requirements:

- Deep knowledge of organic chemistry.
- Fluent in English or Russian.

HETEROCYCLIC CHEMISTRY

Department of Technology for Organic Synthesis

The program focuses on the synthesis and rearrangements of biological active azoles and sulfur containing azoles.

Dr. Tatiana Glukhareva

t.v.gluhareva@urfu.ru

Research interests:

- 1,2,3-Thiadiazoles.
- 1,2,3- Triazoles.
- Pesticides.
- Antitumor activities.
- Rearrangement of heterocycles.

Main publications:

- *Khazhieva I. S., Demkin P. M., Nein J. I., Glukhareva T. V., Morzherin Y. Y.* Synthesis of 1,2,3-Triazolo[1,5-a]Pyridin-8-lum-3-Olates // Chemistry of Heterocyclic Compounds. 2015. V. 51 (2). P. 199–202. DOI: 10.1007/s10593-015-1681-x
- *Kalinina T. A., Shakhmina Y. S., Glukhareva T. V., Morzherin Y. Y., Fan Z.-J., Borzenkova R. A., Skolobanova E. S., Kiseleva I. S.* 1,2,3-Thiadiazolyl isocyanates in the synthesis of biologically active compounds. Study of the cytotoxic activity of N-(4-methyl-1,2,3-thiadi-azolyl-5-yl)-N′-(4-methylphenyl)Urea // Chemistry of Heterocyclic Compounds. 2014. V. 50 (7). P. 1039–1046. DOI: 10.1007/s10593-014-1561-9
- *Platonova A. Yu., Glukhareva T. V., Zimovets O. A., Morzherin Y. Yu.* Tert-Amino effect: The Meth-Cohn and Reinhoudt reactions (Review) // Chemistry of Heterocyclic Compounds. 2013. V. 49 (3). P. 357–385. DOI: 10.1007/s10593-013-1257-6
- *Kalinina T. A., Shatunova D. V., Glukhareva T. V., Morzherin Yu. Yu.* Synthesis of 1,2,3-Triazolo[1,5-a]Pyridin-8-lum-3-Olates // Chemistry of Heterocyclic Compounds. 2013. V. 49 (2). P. 350–352. DOI: 10.1007/s10593-013-1255-8

Entry requirements:

- Deep knowledge of organic chemistry.
- Fluent in English or Russian.

SYNTHESIS OF NOVEL MONO-, POLY- AND MACROCYCLIC ORGANIC PHOTOSENSITIVE MATERIALS (ORGANIC PHOTONICS)

Department of Technology for Organic Synthesis

Design and synthesis of new organic materials for molecular electronics.

Dr. Nataliya Belskaya
Professor

n.p.belskaya@urfu.ru

Research interests:

- Reactions of heterocyclization of functional hydrazones, enamines and ylidenes.
- Investigation of the mechanism of organic reactions by the theoretical and experimental methods.
- Synthesis and investigation of the organic compounds with photoactive properties.

Main publications:

- *Belskaya N. P., Subbotina J., Lesogorova S.* Synthesis of 2H-1,2,3-Triazoles // Topics in Heterocyclic Chemistry. 2015. P. 51–116. DOI: 10.1007/7081_2014_125.0
- *Belskaya N. P., Lesogorova S. G., Subbotina J. O., Koksharov A. V., Slepukhin P. A., Dehaen W., Bakulev V. A.* 1,3-Dipolar cycloaddition of 3-alkylsulfanyl-2-arylazo-3-(tert-cycloalkylamino)acrylonitriles with N-methyl- and N-phenylmaleimides // Tetrahedron. 2015. V. 71 (9). P. 1438–144. DOI: 10.1016/j.tet.2014.12.087

Entry requirements:

- Knowledge of the theoretical aspects of the organic chemistry.
- Basic knowledge and skills for the spectral investigations of the structural features of organic molecules and organic reactions mechanisms.
- Good experimental skills for synthesis of organic compounds, their separation and purification.
- Fluent in English or Russian.

IDENTIFICATION AND STUDIES OF STRUCTURE OF ORGANIC COMPOUNDS AND MATERIALS

Laboratory of Complex Investigations and Expert Evaluation of Organic Materials

Organization and methodical support of scientific research.

Dr. Oleg Eltsov

o.s.eltsov@urfu.ru

Research interests:

- Physicochemical methods of analysis of organic compounds and materials.

Main publications:

- *Shevyrin V., Melkozerov V., Nevero A., Eltsov O., Shafran Y., Morzherin Y., Lebedev A. T.* Identification and analytical characteristics of synthetic cannabinoids with an indazole-3-carboxamide structure bearing a N-1-methoxycarbonylalkyl group // Analytical and Bioanalytical Chemistry. 2015. DOI: 10.1007/s00216-015-8612-7
- *Usachev S. A., Usachev B. I., Eltsov O. S., Sosnovskikh V. Y.* Synthesis of isomerically pure 3-(5-trifluoromethyl-1,2,3-triazol-4-yl)cinnamic acid derivatives via the reaction of 4-aryl-6-trifluoromethyl-2-pyrones with sodium azide // Tetrahedron. 2014. V. 70 (46). P. 8863–8871. DOI: 10.1016/j.tet.2014.09.093
- *Shevyrin V., Melkozerov V., Nevero A., Eltsov O., Baranovsky A., Shafran Y.* Synthetic cannabinoids as designer drugs: New representatives of indol-3-carboxylates series and indazole-3-carboxylates as novel group of cannabinoids. Identification and analytical data // Forensic Science International. 2014. V. 244. P. 263–275. DOI: 10.1016/j.forsciint.2014.09.013
- *Beryozkina T. V., Zhidovinov S. S., Shafran Y. M., Eltsov O. S., Slepukhin P. A., Leban J., Marquez J., Bakulev V. A.* Self-condensation of β-(isoxazol-5-yl) enamines under treatment with acetyl chloride and acids. Synthesis of novel 1,3-diisoxazolyl-1,3-dieneamines and 1,3,5-triisoxazolyl benzenes // Tetrahedron. 2014. V. 70 (25). P. 3915–3923. DOI: 10.1016/j.tet.2014.04.015

Entry requirements:

- Good knowledge in chemistry (predominantly organic chemistry) and basic knowledge of spectral methods of analysis of organic compounds.
- Fluent in English or Russian.

SURFACE CHEMISTRY OF HYDRATED POROUS AND NANOSTRUCTURED MATERIALS. ADSORPTION AND HETEROGENEOUS CATALYSIS

Department of Technology for Organic Synthesis

The program focuses on electro surface characterization of different hydrated pure and composite organic, bioorganic and inorganic porous and nanostructured materials using EPR spectroscopy and pH sensitive nitroxide radicals as spin probes and labels. It is also aimed to study a relationship between electrostatic, acid-base, adsorption and catalytic properties of these materials in a variety of processes for the purpose of optimizing functionalized materials for different applications.

Dr. Elena G. Kovaleva
Professor

e.g.kovaleva@urfu.ru

Research interests:

- Surface electrochemistry of hydrated nanoporous and nanostructured materials.
- EPR spectroscopy of transition metal ions complexes and nitroxides as spin probes and labels in solid-state objects.
- Sorption and catalytic stidies of ion-exchange resins, cellulose - inorganic hydrogels composites and nanoporous oxides of Al, Ti, Zr, Si in different processes.

Main publications:

- *Kovaleva E. G., Molochnikov L. S., Golovkina E. L., Hartmann M., Kirilyuk I. A., Grigoriev I. A.* Electrical potential near hydrated surface of ordered mesoporous molecular sieves assessed by EPR of molecular pH-probes // Microporous & Mesoporous Materials. 2015. V. 203. P. 1–7.
  DOI: 10.1016/j.micromeso.2014.10.010

Entry requirements:

- Knowledge of the theoretical aspects of the organic chemistry.
- Basic knowledge and skills for the spectral investigations of the structural features of organic molecules and organic reactions mechanisms.
- Good experimental skills for synthesis of organic compounds, their separation and purification.
- Fluent in English or Russian.

CHEMICAL TECHNOLOGIES FOR THE SYNTHESIS OF NANOSTRUCTURED FILMS OF SEMICONDUCTOR AND OTHER FUNCTIONAL MATERIALS

Department of Physical Chemistry and Chemistry of Colloids

The program is aimed at training specialists in the field of chemical technology of synthesis of thin-film functional materials for electronic engineering, micro- and nanoelectronics, photonics, and sensor technology.

Dr. Vjacheslav Markov
Professor

v.f.markov@urfu.ru

Research interests:

- Synthesis of new thin-film materials sensitive to the IR spectral domain.
- Synthesis of new materials for efficient solar energy conversion.
- Synthesis of new materials for chemical sensors and environmental monitoring.
- Colloidal chemical synthesis of quantum dots.
- Investigation of the effect of water solution history on chemical reactions.

Main publications:

- *Markov V. F., Maskaeva L. N., Ivanov P. N.* Hydrochemical Deposition of Metal Sulfide Films: Simulation and Experiment. Yekaterinburg: Ur0 RAN. 2006 (a monograph).
- *Markov V. F., Tretyakova N. A., Maskaeva L. N., Bakanov V. M., Muhamedzyanov H. N.* Hydrochemical synthesis, structure, semiconductor properties of films of substitutional Pb1–xSnxSe solid solutions // Thin Solid Films. 2012. V. 520 (16). P. 5227–5231.
  DOI: 10.1016/j.tsf.2012.03.100
- *Markov V. F., Maskaeva L. N.* Nucleation and mechanism of metal sulfide film growth using deposition by thiocarbamide // Russian Chemical Bulletin. 2014. V. 63 (7). P. 1523–1532.
  DOI: 10.1007/s11172-014-0630-7

Entry requirements:

- Master degree in Chemistry, Chemical Technology, or Materials Science and Materials Technology.
- Fluent in English or Russian.

MID-INFRARED FIBER-OPTICAL MATERIALS

Department of Physical Chemistry and Chemistry of Colloids

Training of high-skilled specialists in mid-infrared material science, optics and photonics.

Dr. Liya Zhukova
Professor

l.v.zhukova@urfu.ru

Research interests:

- Hydrochemical synthesis of high-purity metal halides.
- Crystal growth by Bridgman technique.
- IR fiber photonic structure simulation.
- Development of crystalline fiber scintillators.
- Development of mid-infrared fiber-optical devices.

Main publications:

- *Zhukova L., Korsakov A., Korsakova E., Zharikov E.* Structure modeling and growing AgClxBr1-x, Ag1-xTlxBr1-xIx, and Ag1-xTlxClyIzBr1-y-z crystals for infrared fiber optics // Journal of Crystal Growth. 2014. V. 386. P. 94–99. DOI: 10.1016/j.jcrysgro.2013.09.045
- *Korsakov A., Zhukova L., Chazov A., Vrublevsky D., Zhukov V.* Photonic crystalline IR fibers for the spectral range of 2-40 μm // Applied Optics. 2012. V. 51 (13). P. 2414–2418. DOI: 10.1364/AO.51.002414
- *Korsakov A., Zhukova L., Korsakov V., Vrublevsky D., Salimgareev D.* Research of phase equilibriums and modelling of structure of AgBr – TlBr0, 46I0,54 system // Nonferrous metals (Tsvetnye metally). 2014. № 8. P. 50–54. HTTP://www.scopus.com/inward/record.url?eid=2-s2.0-84922450899&partnerlD=40&md5=9761373c05aeea970950a524c500ee9e
- *Korsakov A., Zhukova L., Vrublevsky D., Korsakova E.* Investigating the properties of infrared PCFs based on AgCl-AgBr, AgBr-TlI, AgCl-AgBr-AgI(TlI) crystals theoretically and experimentally // Optics and Spectroscopy (English translation of Optika i Spektroskopiya). 2014. V. 117 (6). P. 987–991. DOI: 10.1134/S0030400X14120121

Entry requirements:

- Decent experimental skills in material synthesis.
- Basic knowledge of fiber optics and photonics.
- Diligence, responsibility.
- Fluent in English or Russian.

MID-INFRARED FIBER-OPTICAL DEVICES

Department of Physical Chemistry and Chemistry of Colloids

Training of high-skilled specialists in mid-infrared material science, optics, photonics, and instrument-making.

Dr. Alexandr Korsakov

a.s.korsakov@urfu.ru

Research interests:

- Crystal growth by Bridgman technique.
- IR fiber drawing by extrusion.
- Development of crystalline fiber scintillators.
- Development of mid-infrared fiber-optical devices (fiber-optical spectrometers and pyrometers).

Main publications:

- *Zhukova L., Korsakov A., Korsakova E., Zharikov E.* Structure modeling and growing AgClxBr1-x, Ag1-xTlxBr1-xIx, and Ag1-xTlxClyIzBr1-y-z crystals for infrared fiber optics // Journal of Crystal Growth. 2014. V. 386. P. 94–99. DOI: 10.1016/j.jcrysgro.2013.09.045
- *Korsakov A., Zhukova L., Chazov A., Vrublevsky D., Zhukov V.* Photonic crystalline IR fibers for the spectral range of 2-40 μm // Applied Optics. 2012. V. 51 (13). P. 2414–2418. DOI: 10.1364/AO.51.002414
- *Korsakov A., Zhukova L., Korsakov V., Vrublevsky D., Salimgareev D.* Research of phase equilibriums and modelling of structure of AgBr – TlBr0, 46I0,54 system // Nonferrous metals (Tsvetnye metally). 2014. № 8. P. 50–54. HTTP://www.scopus.com/inward/record.url?eid=2-s2.0-84922450899&partnerID=40&md5=9761373c05aeea970950a524c500ee9e

Entry requirements:

- Decent experimental skills in material synthesis.
- Basic knowledge of fiber optics and photonics.
- Diligence, responsibility.
- Fluent in English or Russian.

VOLTAMMETRIC SENSORS BASED ON NANOMATERIALS

Department of Analytical Chemistry

Development of sensors, modified with carbon nanotubes and metal nanoparticles for environmental monitoring and pharmaceutical analysis under the control of electrochemical impedance spectroscopy.

Dr. Anatoly Matern
Professor

a.i.matern@urfu.ru

Research interests:

- Electroanalytical chemistry, sensor sand devices for electroanalysis.
- Automatic analysis.
- Environmental monitoring.
- Pharmaceutical analysis.

Main publications:

- *Malakhova N. A., Mysik A. A., Saraeva S. Yu., Stozhko N. Yu., Uimin M. A., Ermakov A. E., Brainina Kh. Z.* A Voltammetric Sensor on the Basis of Bismuth Nanoparticles Prepared by the Method of Gas Condensation // Journal of Analytical Chemistry. 2010. V. 65 (6). P. 640–647. DOI: 10.1134/S1061934810060158
- *Piankova L. A., Malakhova N. A., Stozhko N. Yu., Brainina Kh. Z., Murzakaev A. M., Timoshenkova O. R.* Bismuth nanoparticles in adsorptive stripping voltammetry of nickel // Electrochemistry Communications. 2011. V. 13. P. 981–984. DOI: 10.1016/j.elecom.2011.06.017
- *Sudakova L. A., Malakhova N. A., Stozhko N. Yu.* Bismuth nanoparticles in stripping voltammetry of sulfide ions // Electroanalysis. 2014. V. 26 (7). P. 1445–1448. DOI: 10.1002/elan.201400130
- *Kosykh A. S., Malakhova N. A., Saraeva S. Yu., Kolyadina L. I., Vokhmintsev A. S., Ishenko A. V., Vainshtein I. A.* Application of Carbon screen-printed electrodes modified with multi-walled carbon nanotubes in adsorptive stripping voltammetry of iron (III) // Journal of Applied Chemistry. 2015. V. 88 (4). P. 652–658.

Entry requirements:

- Basic knowledge of electrochemistry.
- Elementary knowledge in nanochemistry.
- Elementary skills in nanomaterials preparation.
- Fluent in English or Russian.

DEVELOPMENT OF NONENZYMATIC METHODS OF ELECTROCHEMICAL IMMUNOASSAY AND DETERMINATION OF DIAGNOSTICALLY SIGNIFICANT PARAMETERS

Department of Analytical Chemistry

The synthesis and investigation of nanomaterials as well as their application as signal forming labels and elements, components of transducers in developments of new nonenzymatic electrochemical methods and sensors for quantitative determination of infectious agents and diagnostically significant parameters (urea, creatinine, cholesterol, etc.). The study of interactions of different nanomaterials with living cells.

Dr. Alisa Kozitsina

a.n.kozitsina@urfu.ru

Research interests:

- Nanomaterials.
- Electrochemically active nanocomposites.
- Voltammetry.
- Electrocatalysis.
- Immunoassay.

Main publications:

- *Brainina Kh. Z., Kozitsina A. N., Glazyrina Y. A.* Hybrid electrochemical magnetic assay for Salmonella Typhimurium detection // IEEE Sensors journal. 2010. V. 10 (11). P. 1699–1704.
  DOI: 10.1109/JSEN.2010.2046410
- *Kozitsina A., Pomorceva E., Suntsova Y., Beykin J., Lagereva Y., Tulakina L., Matern A., Brainina K.* Electroanalysis in the Evaluation of Nanoparticle Toxicity // Analytical and Bioanalytical Electrochemistry. 2013. V. 5 (5). P. 647–664.
  HTTP://www.abechem.com/No.%205-2013/2013,5_5_647-664.pdf

Entry requirements:

- Basic knowledge in analytical and physical chemistry.
- Experimental skills.
- High motivation for the scientific creative activities.
- Conscientiousness.
- Fluent in English or Russian.

INVESTIGATION OF ANTIOXIDANT AND ANTIRADICAL ACTIVITY

Department of Analytical Chemistry

The program objective is the research and development of new approaches for the determination of the integral parameter of antioxidant and antiradical activity of the individual compounds and samples with complex matrix (food, pharmaceuticals, biological objects, etc.), by electrochemical methods and EPR spectroscopy.

Dr. Alla Ivanova

a.v.ivanova@urfu.ru

Research interests:

- Antioxidants and free radicals.
- Antioxidant activity.
- Antiradical activity.
- Electrochemical methods of analysis.
- EPR spectroscopy.

Main publications:

- *Brainina Kh. Z., Ivanova A. V., Sharafutdinova E. N., Lozovskaya E. L., Shkarina E. I.* Potentiometry as a method of antioxidant activity investigation // Talanta. 2007. V. 71. P. 13–18.
- *Brainina Kh. Z., Alyoshina L. V., Gerasimova E. L., Kazakov Ya. E., Beykin Ya. B., Belyaeva S. V., Usatova T. I., Inzhevatova O. V., Ivanova A. V., Khodos M. Ya.* New Electrochemical Methods of Determining Anti-Oxidant Activity of Blood and Blood Fractions // Electroanalysis. 2009. V. 21. P. 618–624.
- *Brainina Kh. Z., Gerasimova E. L., Kasaikina O. T., Ivanova A. V.* Antioxidant Activity Evaluation Assay Based on Peroxide Radicals Generation and Potentiometric Measurement // Analytical Letters. 2011. V. 44 (8). P. 1405–1415.
- *Ivanova A. V., Gerasimova E. L., Kravets I. A., Matern A. I.* Potentiometric Determination of Water-Soluble Antioxidants Using Metal Complexes // Journal of Analytical Chemistry. 2015. V. 70 (2). P. 173–177.

Entry requirements:

- Knowledge of analytical chemistry, physical chemistry, biochemistry fundamentals.
- Fluent in English or Russian.

PRODUCTION OF NEW MATERIALS FOR ELECTROCHEMICAL POWER ENGINEERING

Department of Technology of Electrochemical Processes

The program focuses on the development of new electrode materials for chemical power sources of new generation and fuel cells.

Dr. Yuri Zaykov
Professor

i.p.zaikov@urfu.ru

Research interests:

- Investigation of the kinetics of electrode processes in molten media.

Main publications:

- *Pershin P., Khalimullina Yu., Arkhipov P., Zaikov Yu.* The electrodeposition of lead in LiCl-KCl-PbCl2 and LiCl-KCl-PbCl2-PbO melts // Journal of the Electrochemical Society. 2014. V. 161 (14). P. D824–D830.
  DOI: 10.1149/2.0051501jes
- *Zaykov Yu. P., Isakov A. V., Zakiryanova I. D., Reznitskikh O. G., Chemezov O. V., ARedkin. A.* Interaction between SiO2 and a KF-KCl-K2SiF6 Melt // Journal of Physical Chemistry B. 2014. V. 118. P. 1584–1588.
  DOI: 10.1021/jp4086816
- *Zaikov Yu. P., Batukhtin V. P., Shurov N. I., Ivanovskii L. E., Suzdaltsev A. V.* Calcium production by the electrolysis of molten CaCl2-I. Interaction of calcium and copper-calcium alloy with electrolyte // Metallurgical and Materials Transactions B. 2014. V. 45. P. 961–967.
  DOI: 10.1007/s11663-013-9990-x
- *Zaikov Yu. P., Shurov N. I., Batukhtin V. P., Molostov O. G.* Calcium production by the electrolysis of molten CaCl2-II. Development of the electrolysis devices and process technology approval // Metallurgical and Materials Transactions B. 2014. V. 45. P. 968–974.

Entry requirements:

- Basic knowledge of electrochemical system thermodynamics and main methods of electrochemical processes investigation.
- Fluent in English or Russian.

SIMULATION OF ELECTROCHEMICAL PROCESSES OF OXIDATION AND REDUCTION

Department of Technology of Electrochemical Processes

The program aims at investigating the corrosion phenomena and protective mechanisms on metals in aqueous media.

Dr. Valentin Rudoi
Professor

vlmx@rambler.ru

Research interests:

- Methods of investigation of corrosion processes, electrochemical and non-electrochemical protection methods, non-equipotential and porous electrodes, the protective properties of paint coatings.

Main publications:

- *Kozlova A. N., Ostanina T. N., Rudoi V. M., Umrilova E. N., Malkov V. B.* Corrosion and anodic dissolution of magnesium alloys in the presence of inhibitor // Protection of Metals and Physical Chemistry of Surfaces. 2009. V. 45 (1). P. 100–104. DOI: 10.1134/S207020510901016X
- *Ostanina T. N., Uritskaya A. A., Rudoi V. M., Ostanin N. I., Ryabova O. V.* Effect of pH on the electrodeposition kinetics of copper from acetate and sulfosalicylate complex solutions // Russian Chemical Bulletin. 2014. V. 63 (7). P. 1498–1503. DOI: 10.1007/s11172-014-0626-3
- *Rudoi V. M., Ostanina T. N., Darintseva A. B., Ostanin N. I., Alikhanova I. A., Demakov S. L., Prokof'eva A. S.* Electrodeposition of copper on metal-filled composite support // Russian Journal of Electrochemistry. 2010. V. 46 (6). P. 702–706. DOI: 10.1134/S1023193510060157
- *Popov A. V., Rudoi V. M., Gelobetzkiy V. A., Ostanin N. I., Alimpiev P. A.* The aftereffect of alternating current on the dissolution of steel anode // Corrosion: materials, protection. 2013. № 3. P. 16–20.

Entry requirements:

- Knowledge of the fundamentals of electrochemical kinetics.
- Knowledge of the elements of mathematical statistics.
- Good experimental skills, experience in application of general methods of the study of electrochemical processes.
- Fluent in English or Russian.

ELECTROCRYSTALLIZATION OF METALS IN COMPACT AND DISPERSED FORM

Department of Technology of Electrochemical Processes

The program is aimed at studying the structure and regularities in formation of dendritic and spongy metal deposits with special properties for the creation of a new electrode materials and technologies of 3D prototype.

Dr. Tatiana Ostanina
Professor

t.n.ostanina@urfu.ru

Research interests:

- Research of the influence of electrolysis conditions on the structural and morphological characteristics of the dispersed deposits.
- Study of regularities of anode processes on active metal.

Main publications:

- *Ostanina T. N., Rudoi V. M., Patrushev A. V., Darintseva A. B., Farlenkov A. S.* Modelling the dynamic growth of copper and zinc dendritic deposits under the galvanostatic electrolysis conditions // Journal of Electroanalytical Chemistry. 2015. V. 750. P 9–18.
  DOI: 10.1016/j.jelechem.2015.04.031
- *Ostanina T. N., Rudoi V. M.,Darintseva A. B., Cheretaeva A. O., Demakov S. L., Patrushev A. V.* Effect of the polarization conditions on structural properties of zinc dendritic deposits // Powder Metallurgy and Metal Ceramics. 2014. V. 52 (9-10). P. 489–497.
  DOI: 10.1007/s11106-014-9551-0
- *Ostanina T. N., Rudoi V. M., Ovsyannikova A. N., Malkov V. B.* Magnesium alloys spontaneous dissolution features under external anodic polarization in presence of inhibitors // Russian Journal of Electrochemistry. 2010. V. 46 (6). P. 707–713.
  DOI: 10.1134/S1023193510060169

Entry requirements:

- Knowledge of the fundamentals of electrochemical kinetics.
- Knowledge of the elements of mathematical statistics.
- Good experimental skills, experience in application of general methods of the study of electrochemical processes.
- Fluent in English or Russian.

DEVELOPMENT OF HIGH-TEMPERATURE TECHNOLOGIES IN MELTS OF SALTS. DEVELOPMENT AND MODELING OF TECHNOLOGIES OF PROCESSING OF TECHNOGENIC WASTE

Department of Technology for Inorganic Substances

Development of technological processes of new inorganic materials.

Dr. Sergey Katyshev
Professor

sfkatyshev@mail.ru

Research interests:

- Research of physical and chemical properties of salt – melts.
- Optimization of technologies of inorganic substances and materials.

Main publications:

- *Katyshev S. F., Teslyuk L. M.* Conductivity of molten LiF-ZrF4, NaF-ZrF4, KF-ZrF4, RbF-ZrF4, and CsF-ZrF4 systems // Russian Journal of Electrochemistry. 2009. V. 45(7). P. 823–827.
  DOI: 10.1134/S1023193509070192
- *Bakirov A. R., Nizov V. A., Katyshev S. F.* Conversion of sulfates of nickel in hydroxide (II) // Non-ferrous metals. 2012. № 5. P. 18–21.
  HTTP://www.scopus.com/inward/record.url?eid=2-s2.0-84904904056&partnerID=40&md5=650f2830377413c594d995ad9093d1d0
- *Shoppert N. V., Katyshev S. F., Nikonenko E. A., Kolesnikova M. P.* About receiving pigments from spekatelny slime of Bogoslovsk Aluminium Smelter Nauchno-tekhnichesky bulletin of the Volga region. 2013. № 1. P. 292–295.
- *Trifonov K. I., Afanasyev S. V., Katyshev S. F.* Natural and technogenic sources of pollution of the biosph*ere* Textbook. 2014.

Entry requirements:

- Knowledge of chemistry, physics, mathematics, bases of technology of inorganic substances.
- Fluent in English or Russian.

ENVIRONMENTAL PROTECTION AND RATIONAL USE OF NATURAL RESOURCES; INDUSTRIAL ECOLOGY

Department of Chemical Technology for Fuel and Industrial Ecology

Research activity in the field of sciences about Earth/ecology (chemistry).

Dr. Oleg Sidorov
Professor

sest07@mail.ru

Research interests:

- Carbonization of coalpitch with carcinogenic hydrocarbon emissions.

Main publications:

- *Sidorov O. F.* Carbonization of Coal Pitch with Carcinogenic Hydrocarbon Emissions // Coke and Chemistry. 2012. V. 55 (2). P. 66–72. DOI: 10.3103/S1068364X12020056
- *Sidorov O. F.* Release of Carcinogenic Hydrocarbons in the Carbonization of Coal Pitch // Coke and Chemistry. 2012. V. 55 (12). P. 461–466. DOI: 10.3103/S1068364X12120046
- *Sidorov O. F.* Carbonization of Coal Pitch with Additives // Coke and Chemistry. 2013. V. 56 (1). P. 25–31. DOI: 10.3103/S1068364X13010067
- *Sidorov O. F.* Reducing the Carcinogenic Impact of Pitch Processing // Coke and Chemistry. 2013. V. 56 (2). P. 63–69. DOI: 10.3103/S1068364X13020063

Entry requirements:

- Master degree.
- Fluent in English or Russian.

CHEMICAL ENGINEERING

Department of Machines and Devices for Chemical Production

The program focuses on the research of chemical industry, nuclear industry and similar processes and development of high-performance equipment for this processes implementation.

Dr. Anatoliy Khomiakov
Professor

a.p.khomiakov@urfu.ru

Research interests:

Mathematical modeling and experimental research of:

- Processes of hydrodynamics, heat and mass transfer.
- Processes and equipment for production of chemicals.
- Processes and equipment for reprocessing of spent nuclear fuel.
- Processes and equipment for processing of technogenic formations of nuclear energetic engineering and industry.
- Mechanochemistry.

Main publications:

- *Khomyakov A. P., Kasheev I. D., Komolikov Yu. I.* Interaction between a drying agent and particles dispersed by an airstream atomizer inside a drying chamber // Refractories and Industrial Ceramics. 2003. V. 44 (6). P. 424–426.
- DOI: 10.1023/B:REFR.0000016782.34070.e1
- *Aksenov V. I., Kadnikov A. A., Shastin A. G., Homyakov A. P.* The New Ways of the Ultrasound Use for the NPP Equipment Decontaminatin // Radiation safety problems. 2012. № 1. P. 10–15.
- *Khomjakov A. P., Mordanov S. V., Nikulin V. A., Korchenkin K. K.* Research of Mixing Hydrodynamics in the Nitric Acid Uranium Solutions Reception Tanks // Radiation safety problems. 2014. № 3. P. 32–45.
- *Tashlykov O. L., Sesekin A. N., Shcheklein S. Y., Balushkin F. A., Chentsov A. G., Khomyakov A. P.* Mathematical Simulation Methods Capability For Solution of the Personnel Irradiation Decrease Problem // Radiation safety problems. 2009. № 4. P. 47–57.

Entry requirements:

- Knowledge in heat and mass transfer phenomena.
- Fluent in English or Russian.


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INSTITUTE OF MECHANICS AND MACHINE BUILDING

The Institute of Mechanics and Machine Building (IMMB) is the oldest academic unit of Ural Federal University established in 1920. Under the conditions of the new industrialization taking place in the country, the Institute of Mechanics and Machine Building trains specialists in the most relevant professional fields. We teach our students to design, produce, assemble and use machines. Our graduates have in-depth knowledge of the most complex and advanced equipment and IT. Our students learn not only to control machines, but as well to manage HR in the real sector of economy. The number of orders from the enterprises offering employment opportunities to our graduates today far exceeds the number of students.

The Institute's graduates work as process engineers, construction engineers, specialists in assembling, repairing and maintenance of machines and mechanisms, specialists in the sphere of production processes automation, robot engineering and mechatronics, IT, production organization and management; the range of job positions open for them is from foremen to top managers. During its 91-year history the Institute trained about 50 000 engineers, including more than 400 Candidates of Sciences and 40 Doctors of Sciences.

The graduates of our Institute are engineers, and mechanical engineers are the people who turn the science into the productive force of the society and promote the progress putting into practice the boldest theoretical developments.

Dr. Oleg Blinkov,
Director of the Institute

Ural Federal University

named after the first President of Russia B.N.Yeltsin

Institute of Mechanics and Machine Building

The Institute of Mechanics and Machine Building (IMMB) is the oldest academic unit of Ural Federal University established in 1920.

Today IMMB is:

- 200 faculty staff members, including 20 professors and 100 PhD.
- 3000 students annually.

IMMB Departments:

- Department of Machine-Building Technology.
- Department of Welding Technologies.
- Department of Information Technologies and CAD systems.
- Department of Metal-Cutting Machines and Tools.
- Department of Machinery Production Organization.
- Department of Metallurgical and Rotating Machinery.
- Department of Lifting Appliance and Robots.
- Department of Electronic Engineering.
- Department of Machine Parts.

UrFU Institute of Mechanics and Machine Building offers a wide range of Doctoral Programs in the fields of Mechanics, Machine Building, Engineering, Information Technologies in Machine Building, Welding Technologies and Machinery Production Organization.

DOCTORAL STUDIES AT THE IMMB

The Institute of Mechanics and Machine Building offers a wide range of Doctoral Programs in the fields of:

- Machine-Building Technology.
- Welding Technologies.
- Information Technologies and CAD systems.
- Metal-Cutting Machines and Tools.
- Machinery Production Organization.
- Metallurgical and Rotating Machinery.
- Lifting Appliance and Robots.

In this brochure you will find a brief description of some Doctoral Programs, alongside with the information about the thesis advisors.

We offer:

- 3 or 4 year Doctoral Programs offering an option of defending a Candidate of Science or a PhD thesis.
- Accommodation in a University dormitory.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Russian language courses.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian (B2).
- Interview.

For further information, please contact:

Dr. Aleksandr Petunin,
Deputy director for Research
a.a.petunin@urfu.ru

CAD/CAM SYSTEMS FOR SOLVING OF CUTTING & PACKING PROBLEM AND ROUTING PROBLEMS

Department of Information Technologies and CAD systems

The program is focused on forming of functional competences for the development of CAD/CAM systems for solving of cutting & packing problem, tool path problems, other optimization routing problems, geometrical modeling and generation of NC Programs for CNC Machines.

Dr. Aleksandr Petunin
Professor of Department of Information Technologies and CAD systems

Deputy Director for Research of the Institute of Mechanics and Machine Building

a.a.petunin@urfu.ru
aapetunin@gmail.com

Research interests:

- Cutting & Packing Problem, Nesting Problem.
- Tool Path Problem for the CNC plate cutting machines.
- Discrete optimization.
- Development of software for generation of NC programs for the plate cutting machines.

Main publications:

- *Petunin A. A.* About some strategies of the tool's route designing at the control programs development for the flame cutting machines // Vestnik UGATU. 2009. V. 13, № 2(35). P. 280–286.
- *Petunin A. A.* Automation of Nesting: the Basic Methods of Approach to Development of CAD/CAM System for the Nesting and the Preparation of NC Programs for Cutting Machines of Sheet Material // Information technologies. 2009. № 10. P. 29–34.
- *Petunin A. A., Chentsov A. G., Chentsov P. A.* Local dynamic programming incuts in routing problems with restrictions // Vestn. Udmurtsk. Univ. Mat. Mekh. Komp. Nauki. 2014. № 2. P. 56–75.
- *Petunin A. A., Chentsov A. G., Chentsov P. A.* About a routing problem of the tool motion on sheet cutting // Model. Anal. Inform. Sist. 2015. 22 (2). P. 278–294.

Entry requirements:

- Master's degree in one of the following fields: CAD/CAM systems, Discrete optimization, Programming, Geometrical modeling.

PLM SYSTEMS AND ROBOTICS IN MACHINE BUILDING

Department of Information Technologies and CAD systems

The program is focused on forming of functional competences for the development of software for PLM systems, geometrical modeling and using of robots in machine building.

Dr. Dmitry Kurennov
Head of IT and CAD department
Deputy Director for Education of the IMMB

d.v.kurennov@urfu.ru,
kurennov@gmail.com

Research interests:

- Geometrical modeling.
- Universal CAD systems.
- PLM systems.
- Programming.
- Robotics in mechanical engineering.

Main publications:

- *Kurennov D. V.* Algorithm of conjugation for elements of geometrical objects // Proceedings of the 13th International Workshop on Computer Science and Information Technologies (CSIT'2011), Ufa, 2011. V. 1. P. 182–184.
- *Kurennov D. V.* Development of the geometrical modeling system // Proceedings of 1rd International Conference "Information Technologies and Systems". Chelyabinsk, 2012. P. 56–58 (in Russian).
- *Kurennov D. V., Savchenko O. V.* Intellectual control system of the robot: synthesis of the programming instruments - finite automata and neural networks // Proceedings of 3rd International Conference "Information Technologies and Systems". Chelyabinsk, 2014. P. 87–90 (in Russian).

Entry requirements:

Master's degree in one of following fields:

- CAD/CAM systems.
- Programming.
- Geometrical modeling.
- Robotics in mechanical engineering.

WELDING AND RELATED PROCESSES

Department of Welding Technologies

The program is focused on forming of functional competences in Welding Technologies and related processes, such as Laser Treatment, Surfacing, Thermal Spraying, Feedstock Materials, Modeling and Simulation, Study of Structure and Properties.

Dr. Yury Korobov
Professor, Head of Department of Welding Technologies
Honored Inventor of Russia

yukorobov@gmail.com

Research interests:

- Modeling and Simulation of High-Temperature Processes.
- Study of structure, mechanical properties and wear of surfaced and sprayed layers.
- Development of Core Wires.
- CAE analysis of weld joints.
- Welding and Related Processes – Equipment, Technologies.

Main publications:

- *Boronenkov V., Zinigrad M., Leontiev L., Pastukhov E., Shalimov M., Shanchurov S.* Phase Interaction in the Metal – Oxide Melts – Gas – System, Springer Berlin, 2012. Heidelberg. P. 407.
- *Boronenkov V., Korobov Yu.* Fundamentals of Arc Spraying. Physics-chemical Regularities, 2012. Ekaterinburg: UrFU. P. 268 (in Russian).
- *Korobov Y. S., Belozertsev A. A., Filippov M. A., Shumyakov V. I.* A model of heating a flux-cored wire in arc metallizing and analysis of the structure of the coating // Welding International. 2010. V. 24. № 7. P. 546–551. DOI: 10.1080/09507110903569115
- *Korobov Yu. S., Nevezhin S. V., Filippov M. A., et al.* Effect of production methods on tribological characteristics of babbitt coatings // Journal of friction and wear. 2012. 33 (3) P. 190–194.
- *Korobov Yu., Shalimov* Energy efficiency by thermal spraying // Ecology and the Environment, 2014. V. 1, № 190. P. 455–466. DOI: 10.3103/S1068366612030063

Entry requirements:

Master's degree in one of following fields:

- Material science.
- Welding and related processes.
- Engineering.

MACHINERY PRODUCTION ORGANIZATION

Department of Machinery Production Organization

The program is aimed at supporting the sustainable innovative development of industrial enterprises, organization and management of the knowledge-intensive machinery production sustainability in the risk conditions. It is focused on forming of functional competences for the production organizers of the knowledge-intensive oriented product creation and production. The students will have opportunity to conduct research for their PhD thesis and participate in research activities of the department.

Dr. Elena Kuznetsova
Professor, Head of Department of Machinery Production Organization

Elena.bstm@gmail.com

Research interests:

- Study of core technological and organizational competences at the industrial enterprises.
- Life-cycle management of the knowledge-intensive product.

Main publications:

- *Kuznetsova E., Norkina O., Bryl A.* Organizational factors of the competitiveness on different stages of the enterprise life cycle // Problems of safe development of modern society: proceedings of the IV International scientific-practical conference. In 2 parts. Part II. Yekaterinburg, publishing house USC UrFU. 2014. P. 27–34.
- *Kuznetsova E., Chopovda E.* Ensuring the technical competence of manufacturing enterprises // Vestnic UrFU Economic and Management series. 2013. № 2. P. 27–35.
- *Kuznetsova E., Chopovda E.* Competence in the organization and formation of the organizational culture of an industrial enterprise// Vestnic UrFU. Economic and Management series. 2012. № 1. P. 4–12.
- *Kuznetsova E.* Problems of organization of activity of industrial area (example of Vysokogorsky mechanical plant) // Organizator proizvodstva. 2011. № 1. P. 37–43.

Entry requirements:

- Master's degree in the field of machinery production technology, organization of machinery production.

URAL POWER ENGINEERING INSTITUTE

Modern power generation sector is an integral part of the society infrastructure and by right is considered one of the strategic cores of our country.

Sustainable development of Russia requires taking such modernization measures as increasing energy efficiency, resource saving, developing nuclear technologies and alternative energy sources, improving the methods of energy transmission and conversion, applying new or considerably advanced technologies of energy consumption.

The mission of the Ural Power Engineering Institute consists in providing the processes of innovative development of fuel and energy branch of economy with scientific, educational, innovative solutions and highly qualified intellectual personnel of new generation.

The key objective of the Ural Power Engineering Institute is to create conditions for the integration of scientific, educational and socio-economic processes and the activation of the innovative development center of regional and national power economy and the forward-looking human resources preparation needed for the implementation of the Power Strategy of Russia.

The Institute has necessary innovative capacity to undertake research and development activities in the key areas of modern power and production sectors focused on improving energy and resource efficiency of the Russian economy, security and reliability of energy infrastructures, improving the quality of housing services. Modern laboratory facilities and highly qualified personnel allow solving a wide range of applied and scientific problems, providing complete product development cycle from concept to implementation into full-scale production.

We are looking forward to cooperating with companies and organizations to jointly address current and future challenges facing the energy industry and housing and communal services!

Dr. Sergey Sarapulov,
Director of the Institute

Ural Federal University
named after the first President of Russia B.N.Yeltsin
Ural Power Engineering Institute

Ural Power Engineering Institute in its current state was founded in 2011 through the merger of the Faculty of Thermal Power Engineering and the Faculty of Electrical Engineering (both of them having more than 45-year history).

Scientific research carried out in the Ural Power Engineering Institute covers the fields included in the List of Crucial Technologies of the Russian Federation approved by the Order of the President of the RF of July 07, 2011 No 899 "About the approval of priority directions of science, technology and engineering development in the Russian Federation and crucial technologies of the Russian Federation".

The leading scientific schools of the Ural Power Engineering Institute are:

- Ural School of Electrical Engineering (headed by DSc, Professor Petr Bartolomey and DSc, Professor Andrey Pazderin).
- Ural School of Turbine Plants (headed by DSc, Professor Yuri Brodov).
- Ural School of Heat Power Industry (headed by DSc, Professor Vladimir Munc and DSc, Professor Alexander Ryzhkov).
- Energy-saving Electromechanical and Electrotechnological Installations and Systems (headed by DSc, Professor Fedor Sarapulov and DSc, Professor Anatoly Plastun).
- Safety and Efficiency of Nuclear Power Stations (headed by DSc, Professor Sergey Sheklein).

DOCTORAL STUDIES AT THE UPEI

Ural Power Engineering Institute offers a wide range of Doctoral Programs in the fields of electrical energy and thermal power energy. In this brochure, you will find a brief description of the departments of the UPEI and its Doctoral Programs, along with the information about the thesis advisors.

We offer:

- 4 year Doctoral Programs.
- Accommodation in a University dorm.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Free Russian language courses.
- The possibility to defend the Candidate of Science* theses or an UrFU PhD thesis.

*The first doctoral degree in Russia (Kandidat Nauk). It is gained after 3 to 5 years in a post-graduate school. The qualification requirements include mandatory publications in peer reviewed journals and approval on the Federal government level.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian.
- Interview.

For further information, please contact:

Dr. Sergey Kokin,
Professor, Deputy Director for Research and Innovations
s.e.kokin@urfu.ru

INVESTIGATION OF FLOW DISTRIBUTION AND ELECTRIC POWER LOSSES IN POWER GRID

Department of Automated Electric Systems

The program is focused on the study of flow distribution in electrical networks, loss analysis and diagnostics of electricity metering systems.

Dr. Andrey Pazderin
Head of Department, Professor, Doctor of Technical Sciences

a.v.pazderin@urfu.ru

Research interests:

- Modeling of flow distribution of electric energy and loss calculation.
- Examination of standards for technological losses of electricity during its transmission and distribution networks.
- Definition of quality of electric power supply systems of industrial enterprises and cities.

Main publications:

- *Pazderin A. V., Egorov A. O., Eroshenko S. A.* The energy meters allocation in electric systems on the basis of observability theory, 2010, 2010 9th Conference on Environment and Electrical Engineering. EEEIC 2010.
- DOI: 10.1109/EEEIC.2010.5489950
- *Pazderin A. V., Kokin S. E., Egorov A. O., Kochneva E. S.* Solution of energy flow problem using state estimation technique, 2009. IECON Proceedings (Industrial Electronics Conference).
- DOI: 10.1109/IECON.2009.5414817
- *Plesniaev E. A., Pazderin A. V.* Analysis of the computation techniques for energy flow problem solving, 2005, EUROCON 2005 / The International Conference on Computer as a Tool Belgrade, 2005. P. 1469–1472.
- *Pazderin A. V.* Solving the problem of determining energy flows in an electric network using the methods of state estimation, Elektrichestvo 12. 2004.

INFORMATION SUPPORT FOR THE NATIONAL GRID MANAGEMENT TASKS IN A COMPETITIVE MARKET

Department of Automated Electric Systems

The program includes theoretical and practical courses on the structure and functions of the automated electric energy systems, modern dataware and software. Issues of intellectual operational dispatch management and operating conditions planning, forming recommendations to a dispatcher, observability and state estimation of power system are being discussed. Great attention is paid to modern methods and algorithms for optimization of power systems, primarily based on nonlinear programming of the first and the second order (generalized method of Newton and approximating programming), the problems of transition to the planning of modes in a competitive market with the use of methods of linear and integer programming to meet new management tasks. Fundamental principles for improving the reliability of telemetry based on the theory of state estimation are studied.

Dr. Petr Bartolomey
Professor, Doctor of Technical Sciences

p.i.bartolomey@urfu.ru

Research interests:

- Information and mathematical support of the automated systems of dispatching management of power systems.

Main publications:

- *Bartolomey P. I., Eroshenko S. A., Semenenko S. I., Suvorov A. A.* PMU-based informational support of power system control tasks, WIT Transactions on Ecology and the Environment, 190. 2014. V. 1. P. 307–318.
- DOI: 10.2495/EQ140301
- *Bartolomey P. I., Eroshenko S. A., Lebedev E. M., Suvorov A. A.* New information technologies for state estimation of power systems with FACTS, IEEE PES Innovative Smart Grid Technologies Conference Europe, 2012.
- DOI: 10.1109/ISGTEurope.2012.6465686
- *Arsamastsev D. A., Bartolomey P. I., Okulovski S. K.* New improved quadratic programming methods for super-large power systems analysis, Proceedings of the Eighth Power Systems Computation Conference; Helsinki, Finland. 1984. P. 710–716.

ANALYSIS OF STRUCTURAL AND PERFORMANCE RELIABILITY OF POWER SYSTEMS

Department of Automated Electric Systems

The program is focused on forming the theoretical and practical knowledge of the probabilistic simulation of power systems.

Dr. Vladislav Oboskalov
Professor, Doctor of Technical Sciences

v.p.oboskalov@urfu.ru

Research interests:

- Planning the composition of operating units of power stations.
- Probabilistic transformation of electrical circuits in the calculation of the balance indicators and structural reliability of power systems.

Main publications:

- *Oboskalov V. P.* Estimation of probabilistic c simulation power system balance reliability indexes, Izvestiya Akademii Nauk, Energetika 3. 1994. P. 15–20.
- *Oboskalov V. P.* Probabalistic models for capacity back-up in power pools with limited tie line transfer capacity, Elektrichestvo 1. 19991. P. 13–18. HTTP://www.scopus.com/inward/record.url?eid=2-s2.0-0025927327&partnerID=40&md5=025b6fc3798c7852f3b79ccb0f574dbc
- *Oboskalov V. P.* Analysis of mathematical models used in calculating reliability of high voltage circuit breakers, Electric Technology, USSR 2. 1979. P. 84–95.

ENERGY-INFORMATIONAL MODELS OF FUNCTIONING AND DEVELOPMENT OF POWER SUPPLY SYSTEMS FOR MEGALOPOLISES

Department of Automated Electric Systems

The program focuses on the study of the features of power supply systems of megalopolises.

Dr. Sergey Kokin
Professor, Doctor of Technical Sciences

s.e.kokin@urfu.ru

Research interests:

- Adaptive and multi-level information systems, decision support for management tasks and objectives of the development of power supply systems of large cities.
- Structures of storing information about objects and the individual elements of the urban power grid.
- Methods indicative analysis of the functional state of electrical equipment and assessment modes of power supply systems in general.

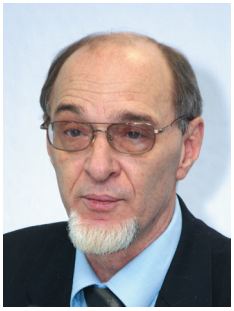
Main publications:

- *Kokin S. E., Pazderin A. V., Adarichev E. N.* Ways of decreasing maximum and equalizing curve of big cities' power demand / 1st International Conference on Sustainable Power Generation and Supply. SUPERGEN '09, 2009. DOI: 10.1109/SUPERGEN.2009.5347879
- *Kokin S., Dmitriev S., Khalyasmaa A.* Evaluation model for urban power supply systems // Advanced Materials Research. 2012. 468-471. P. 1642–1648. DOI: 10.4028/www.scientific.net/AMR.468-471.1642
- *Dmitriev S. A., Kokin S. E.* Working out the policy of technical modernization of big cities' power supply on the basis of network condition estimation model / 2010 9th Conference on Environment and Electrical Engineering, 2010. DOI: 10.1109/EEEIC.2010.5489979
- *Kokin S. E.* Polygon scheme with a replacement switch / 3rd International Conference on Deregulation and Restructuring and Power Technologies, DRPT 2008. DOI: 10.1109/DRPT.2008.4523649

INVESTIGATION OF THERMAL PROCESSES IN THE ACTIVE ZONES OF NUCLEAR REACTORS WITH GAS AND LIQUID METAL COOLANTS

Department of Nuclear Power Plants and Renewable Energy Sources

The program is aimed at studying the efficiency of heat removal from nuclear fuel in stationary and transient operation of nuclear power plants.



Dr. Sergey Shcheklein
Head of Department,
Professor, Doctor of
Technical Sciences

s.e.shcheklein@urfu.ru

Research interests:

- Modeling of heat transfer processes in stationary and transient operation of the NPP.
- Mathematical modeling and optimization of radiation loads at all stages of the life cycle of nuclear power plants.
- Research and development efficiency of passive systems of heat removal from NPP equipment in emergency situations.
- Development of systems for reliable power supply equipment based on renewable energy sources.

Main publications:

- *Shcheklein S. E., Kostomarov V. M., Beketov V. G. and others.* Hydrodynamic aspects of the creation of liquid systems regulirovaniya power channel-type nuclear reactors // Physical himicheskie processes in nuclear power plants. M.: MEI, 1981.
- *Kozlov V. M., Mironov Y. L., Musvik A. B., Shcheklein S. E., Kostomarov V. M.* Experimental studies of hydrodynamics of two-phase flow for drop // Thermophysics energeticheskih nuclear installations. Sverdlovsk: UPI, 1982.
- *Tashlykov O. L., Shcheklein S. E., Kadnikov A. A.* Analysis of damage to the steam generators, heated pressurized water from the point of view of a controlled extension of the resource to replace the steam generators // News of higher educational institutions. Nuclear energy. 2007. № 4.
- *Sesekin A. N. Tashlykov O. L., Shcheklein S. E., Kuklin M. J., Chentsov A. G., Kadnikov A. A.* Using the method of dynamic programming to optimize the path of the radiation workers in hazardous areas to minimize exposure // News of higher educational institutions. Nuclear energy. 2006. № 2.

INCREASE OF THE EFFICIENCY OF USE OF HEAT AND ELECTRIC ENERGY

Department of Nuclear Power Plants and Renewable Energy Source

The program is focused on obtaining theoretical and practical knowledge in the field of efficient use of heat and electricity at the stages of production, transmission and use.

Dr. Nikolay Danilov
Professor, Doctor of Economics

Research interests:

- Development of resource-saving technologies.
- Energy use of low-grade and low-grade fuel and energy resources in the regional and local energy.
- Assessment impact of energy conservation on the environment.
- Creation of methodology for determining the energy intensity of the gross regional product and ways to reduce it.

Main publications:

- *Danilov N. I.* Reference Points of Industrial Policy in Sverdlovsk Oblast // Problems of Economic Transition, NY. August 1999. V. 42, № 4.
- *Danilov N. I.* Energy Efficiency as a Basis of Sustainable Regional Development // Euro-Eco. Hannover 2009. Das Internationale Symposium "Ökologische, Technologische und Rechtliche Aspekte der Lebensversorgung" (3–4 Dezember 2009): Hannover: Europäischen Wissenschaftlichen Gesellschaft, 2009.
- *Danilov N. I.* Regional Energy Efficiency Improvement Program as Basis for Low-Carbon Economy // Euro-Eco. Hannover 2011. Ökologische, Technologische und Rechtliche Aspekte der Lebensversorgung: Das Internationale Symposium (21–22 November, 2011). Hannover: Europäischen Wissenschaftlichen Gesellschaft, 2011. HTTP://www.eu-eco.eu/abstr-2011/articles/regional-energy-efficiency-improvement-program-as-basis-for-low-carbon-economy.html
- *Danilov N. I., Schtschelokov J. M., Stepanova M. A.* Energetische Analyse in Betrieben unter Russischen Verhältnissen // Euro-Eco. Hannover 2012. Ökologische, Technologische und Rechtliche Aspekte der Lebensversorgung: Das Internationale Symposium (29–30 November, 2012). Hannover: Europäischen Wissenschaftlichen Gesellschaft, 2012.

DYNAMICAL SYSTEMS WITH A COMPOSITE RIGHT-HAND SIDE AND THE PROBLEMS OF OPTIMAL IMPULSE CONTROL

Department of Applied Mathematics

The program aims to develop the theory of dynamical systems with impulse structure and problems of optimal control pulse.

Dr. Alexander Sesekin
Head of Department, Professor, Doctor of Sciences

a.n.sesekin@urfu.ru

Research interests:

- The issues of existence and descriptions of the solutions of dynamical systems with impulse structure.
- Optimal control of dynamic systems with impulse control.

Main publications:

- *Zavalishchin S. T., Sesekin A. N.* Dynamic Impulse Systems: Theory and Applications, Kluwer Academic Publishers, Dordrecht, 1997. 256 p.
- *Sesekin A. N., Fetisova Yu. V.* Functional Differential Equations in the Space of Functions of Bounded Variation // Proceeding of the Steklov Institute of Mathematics. 2010. Suppl. 2. P. S258–S265.
- *Zhelonkina N. I., Lozhnikov A. B., Sesekin A. N.* On Pulse Optimal Control of Linear Systems with Aftereffect // Automation and Remote Control. 2013. V. 74. Is. 11. 2013. P. 1802–1809.
- DOI: 10.1134/S0005117913110039
- *Sesekin A. N.* Singular linear-quadratic control problem for systems with linear delay // American Institute of Physics. Conference Proceeding. 2013. V. 1570. P. 268–275.

DISCRETE OPTIMIZATION PROBLEMS IN THE NUCLEAR INDUSTRY

Department of Applied Mathematics

The program is aimed at solving the problems of minimization of dose costs for repair work and work related to the dismantling of radiation dangerous equipment.

Dr. Alexander Sesekin
Professor, Doctor of Sciences

a.n.sesekin@urfu.ru

Research interests:

- The problems of minimizing the radiation dose when performing maintenance and repair work.
- The problems of minimizing the radiation dose of radiation during removal of hazardous equipment.

Main publications:

- *Sesekin A. N., Chentsov A. A., Chentsov A. G.* A Generalized Courier Problem with Cost Function Depending on the List of Tasks // Journal of Computer and Systems Sciences International. 2010. V. 49, № 2. P. 234–243.
  DOI: 10.1134/S1064230710020097
- *Chentsov A. G., Sesekin A. N., Shcheklein A. N., Tashlykov O. L.* On One Modification of Traveling Salesman Problem Oriented on Application in Atomic Engineering. American Institute of Physics. Conference Proceeding. 2010. V. 1293. P. 197–202.
  DOI: 10.1063/1.3515586
- *Sesekin A. N., Chentsov A. A., Chentsov A. G.* On a Bottleneck Routing Problem // Proceedings of the Steklov Institute of Mathematics. 2011. V. 272. Suppl. 1. P. S165–S185.
  DOI: 10.1134/S0081543811020131
- *Sesekin A. N., Tashlykov O. L., Shcheklein S. Y., Chentsov A. G.* Route optimization in the removal of radiation hazards (Conference Paper) // WIT Transactions on Ecology and the Environment. 2010. V. 2. P. 919–926. 1st International Conference on Energy Production and Management in the 21st Century: The Quest for Sustainable Energy; Ekateringburg; Russian Federation. 23 April 2014 through 25 April 2014.
  DOI: 10.2495/EQ140862

HIGHLY EFFICIENT ENERGY CONVERSION AND GENERATION TECHNOLOGIES BASED ON FOSSIL FUELS

Department of Thermal Power Plants

The program is focused on the development of new energy-efficient and environment-friendly energy production technologies with the application of modern methods of research: studying of kinetics of organic fuel conversion on the basis of the synchronous thermal analysis complex, numerical modeling of the power equipment with use of modern program complexes (ANSYS), calculation and analytical technological researches with application of the program complex Thermoflow, etc.

Dr. Alexander Ryzhkov
Professor

tes.urfu@mail.ru

Research interests:

- Solid fuels combustion and gasification technologies; complex thermodynamic calculations for IGCC power plants; CFD modeling for the entire gasifier processes; kinetics experiments with coal and biomass; high-temperature air heating technologies; GT operating on LCV syngas.

Main publications:

- *Bogatova T. F., Ryzhkov A. F., Gordeev S. I., Abaimov N. A., Valtsev N. V.* The analysis of hybrid scheme of steam-gas technologies on IGCC low-calorie gases // 31st Annual International Pittsburgh Coal Conference: Coal - Energy, Environment and Sustainable Development, PCC, 2014.
- *Gordeev S. I., Ryzhkov A. F., Bogatova T. F., Val'Tsev N. V., Khudyakova G. I., Osipov P. V., Abaimov N. A., Chernyavskii N. V., Shul'man V. L.* Development of low-temperature thermochemical conversion reactors for coal power engineering // Thermal Engineering. December 2013. V. 60. Is. 12. P. 895–903.
DOI: 10.1134/S0040601513120100
- *Ryzhkov A. F., Bogatova T. F., Silin V. E., Nadir S. M. Sh.* Ignition and combustion features of biofuel // Journal of Engineering Physics and Thermophysics. 2011. Vol. 84, № 4. P. 888–897.
DOI: 10.1007/s10891-011-0547-z

OPTIMIZATION OF WATER-CHEMISTRY CONDITIONS OF THERMAL POWER PLANTS

Department of Thermal Power Plants

The program is aimed at the optimization of the water-chemical conditions of thermal power plants on the basis of the comprehensive analysis of various water-chemical conditions indicators with use of chemical and technological monitoring systems of chemical quality.

Dr. Nadezhda Belokonova
Professor

tes.urfu@mail.ru

Research interests:

- Improvement of water-chemical conditions of power plant boilers; improvement of power plant cooling ponds water quality; environmental monitoring of surface waters.

Main publications:

- *Belokonova N. A., Zubareva E. L., Antropova O. A.* Environmental monitoring surface sources of Thermal Power Plants // Izvestiya vuzov. 2011. № 9–10. P. 154–160 (in Russian).
- *Belokonova N. A., Abaturova T. I., Ivonin S. J.* Patent "Method of monitoring water contamination when washing boiler unit" RU 2011. № 2408884. (in Russian).
- *Belokonova N. A., Zubareva E. L., Antropova O. A.* Environmental monitoring: organic pollution control of surface water // Water: chemistry and ecology. 2010. № 8. P. 2–5.

RESEARCH AND DEVELOPMENT OF THE METHODS FOR INCREASING EFFICIENCY AND RELIABILITY OF TURBINE EQUIPMENT

Department of Turbines and Engines

The program is focused on the study of possible ways to increase efficiency and reliability of turbines and turbine equipment within its lifecycle stages: production and operation.

Dr. Yuri Brodov
Head of Department,
Professor, Doctor of
Technical Sciences

u.m.brodov@urfu.ru

Research interests:

- Design of turbines and turbine equipment.
- Experimental study of turbomachines at operational conditions.
- Turbines and turbine equipment modernization on site.

Main publications:

- *Plotnikov L. V., Zhilkin B. P., Brodov Y. M.* Influence of High-treguency Gas-Dynamic Unsteadiness on Heat Transfer in Gas Flous jf Internal Combustion Engines // Applied Mechanics and Materials. 2015. V. 6915. P. 631–636.
- *Brodov Y. M., Ryabchikov A. Y., Aronson K. E., Zhelonkin N. V.* New oil coolers for large-capacity turbines produced by the ural turbine works // Thermal Engineering (English translation of Teploenergetika). V. 61. Is. 12. 1 December 2014. P. 884–888.
  DOI: 10.1134/S0040601514120015
- *Brodov Y. M., Aronson K. E., Ryabchikov A. Y., Nirenstein M. A.* Heat transfer augmentation during water steam condensation on twisted profile tubes // WIT Transactions on Ecology and the Environment, 190. 2014. V. 1. P. 479–490.
  DOI: 10.2495/EQ140461

TECHNICAL STATE MONITORING AND DIAGNOSTICS OF STEAM TURBOMACHINES EQUIPMENT

Department of Turbines and Engines

The program is focused on technical state monitoring and diagnostics of power equipment for thermal power stations.

Dr. Konstantin Aronson
Professor, Doctor of Technical Sciences

k.e.aronson@urfu.ru

Research interests:

- Systems for diagnostics, evaluation, determination of residual life term of steam turbines heat exchange equipment at thermal power plants.
- Systems for technical and economic parameters evaluation of power units' equipment and thermal power plants in general.
- Prospective jet devices.
- Software for personnel testing at thermal power plants.

Main publications:

- Development of a procedure for substantiating replacement terms for the condenser tubes of steam turbine installations / K. E. Aronson, A. Y. Ryabchikov, Y. M. Brodov, M. I. Loginov // Thermal Engineering (English translation of Teploenergetika). V. 60. Is. 8. August 2013. P. 567–572. DOI: 10.1134/S0040601513080016
- Development of a system for monitoring technical state of the equipment of a cogeneration steam turbine unit / K. E. Aronson, Y. M. Brodov, V. B. Novoselov // Thermal Engineering (English translation of Teploenergetika). V. 59. Is. 12. December 2012. P. 944–947. DOI: 10.1134/S0040601512120026
- An analysis of indicators characterizing the reliability of auxiliary equipment of power units / K. E. Aronson, Yu. M. Brodov, P. N. Plotnikov, A. Yu. Ryabchikov, B. E. Murmanskii, M. A. Nirenshtein // Thermal Engineering (English translation of Teploenergetika). V. 58. Is. 8. August 2011. P. 623–628. DOI: 10.1134/S0040601511080039

IMPROVING THE EFFICIENCY AND RELIABILITY OF TURBINES HEAT EXCHANGERS

Department of Turbines and Engines

The program is aimed at improving the efficiency and reliability of turbines heat exchangers.

Dr. Aleksandr Ryabchikov
Professor, Doctor of Technical Sciences

lta_ugtu@mail.ru

Research interests:

- Research and application of new advanced heat transfer surfaces.
- New design development for environmentally friendly oil coolers.
- Modernization of turbine heat exchangers to increase their efficiency and reliability.

Main publications:

- New oil coolers for large-capacity turbines produced by the ural turbine works / Y. M. Brodov, A. Y. Ryabchikov, K. E. Aronson, N. V. Zhelonkin // Thermal Engineering (English translation of Teploenergetika). V. 61. Is. 12. 1 December 2014. P. 884–888.
  DOI: 10.1134/S0040601514120015
- Single-phase media hydrodynamics and heat transfer in heat exchangers with twisted profile tubes / Y. M. Brodov, K. E. Aronson, A. Y. Ryabchikov, M. A. Nirenstein // WIT Transactions on Ecology and the Environment, 190. 2014. V. 1. P. 395–406.
  DOI: 10.2495/EQ140381
- Heat transfer augmentation during water steam condensation on twisted profile tubes / Y. M. Brodov, K. E. Aronson, A. Y. Ryabchikov, M. A. Nirenstein // WIT Transactions on Ecology and the Environment, 190. 2014. V. 1. P. 479–490.
  DOI: 10.2495/EQ140461
- Thermal power stations: Modernization of heat exchangers in steam turbine units taking features of their operation at specific thermal power plants into account / A. Yu. Ryabchikov, K. É. Aronson, Yu. M. Brodov, S. I. Khaet, S. N. Blinkov, N. V. Zhelonkin // Power Technology and Engineering. 2010. 44 (3). P. 208–212.
  DOI: 10.1007/s10749-010-0166-4

ADVANCED AUTOMATED CONTROL AND PROTECTION SYSTEMS FOR STEAM TURBINES

Department of Turbines and Engines

The program is addressed to research and optimization of control and protection systems for steam turbines.

Dr. Vladimir Novoselov
Doctor of Technical Sciences

vnowoselov@mail.ru

Research interests:

- Electrohydraulic control and protection systems for steam turbines.
- Research and optimization of control system algorithms for steam turbines.
- Multichannel measurement systems with various logical approaches.
- Diagnostic of control and protection systems for steam turbines.

Main publications:

- *Novoselov V. B.* Research generalization of the speed controller electrohydraulic control system of the steam turbine // Tyazheloe mashinostroenie. 2012. № 4. P. 18–26.
- *Novoselov V. B., Murmansky B. E., Lebedev V. V.* Diagnostic of a steam turbine control and protection system at the current stage // Tyazheloe mashinostroenie. 2012. № 2. P. 69–74.
- *Fragin M. S., Novoselov V. B.* Influence of steam and water scopes in feedwater and network-water heaters on a steam turbine's operating conditions at electric load discharges // Elektritsheskie stantsii. 2011. № 2. P. 31–38.
- *Novoselov V. B.* Investigation and optimization of parameters of the electrohydraulic control system of a steam turbine // Teploenergetika. 2009. № 4. P. 32–37.

ROTOR DYNAMICS AND VIBRATION STABILITY IN TURBOMACHINES

Department of Turbines and Engines

The program includes theoretical and practical courses regarding the issues of rotor dynamics at different types of bearings (rollers, hydrostatic and hydrodynamic, active magnetic). Vibration reliability, dynamic strength of components, defect diagnostics, computational modeling on modern software are also deeply discussed. Special attention is paid to expert systems, diagnostic methods and algorithms.

Dr. Evgenii Yuriev
Professor, Doctor of Technical Sciences

evuriev@gmail.com

Research interests:

- Rotor dynamic modeling.
- Expertise of turbine vibration condition, modernization of prevention and protection algorithms based on vibration control.
- Actual quality estimation of rotor balancing process, specification and verification of balance tolerances.
- Hardware, information and software support of automated diagnostic systems.

Main publications:

- Results of vibration tests of blades of the last stage of the k-800-240-5 turbine under operating conditions / K. N. Borishanskii, B. E. Grigor'ev, A. V. Gruzdev, A. V. Naumov, E. V. Ur'ev, S. Yu. Grigor'ev // Power Technology and Engineering. 2004. T. 38, № 3. P. 164–167.
- Use of Honeycomb Seals in Steam Turbines / E. V. Ur'ev, S. V. Zhukov // Power Technology and Engineering. 2008. V. 42, № 6. P. 339–343. DOI: 10.1007/s10749-009-0061-z
- Diagnostic of Transversal Non-Circular Crack in Turbomachine Rotors / A. V. Kistoichev, E. V. Uryev // 12th International Scientific and Engineering Conference "Hermetic Sealing, Vibration Reliability and Ecological Safety of Pump and Compressor Machinery "HERVICON-2008". Poland, Kielce-Przemysl, 2008.
- Correction of Rotor by Systems of Balanced Loads / E. V. Ur'ev, A. V. Kistoichev, A. V. Oleinikov // Power Technology and Engineering. 2009. V. 43, № 2. P. 103–107.

MODERNIZATION OF DESIGN AND OPERATIONAL PROCESSES FOR AUXILIARY EQUIPMENT FOR STEAM TURBINES BASED ON MODERN IT

Department of Turbines and Engines

The program is focused on the problems of design, technological preparation of design and production of steam turbines and equipment and information support of steam turbines within a lifecycle.

Dr. Vitalii Brezgin
Professor, Doctor of Technical Sciences

v.i.brezgin@urfu.ru

Research interests:

- Problems of aerohydrodynamical vibration initiation of turbine elements during operation.
- Modernization of design methods for layout of the equipment based on modern technologies.
- Modernization of design methods for steam turbines based on modern technologies.
- CAD, CAM and CAE applications for design and operation processes improvement.

Main publications:

- *Shibaev T. L., Gol'dberg A. A., Brezgin V. I.* Using Computer-Aided Design Systems for Developing Layouts of Steam-Turbine Units // Thermal Engineering. 2008. V. 55, № 8. P. 692–697.
  DOI: 10.1134/S0040601508080119
- *Aronson K. E., Brodov Yu. M., Ryabchikov A. Yu., Brezgin D. V., Brezgin V. I.* Experience Gained from Development of Modernized Oil Coolersfor the Oil Supply System Used in 800-MW Turbines // Thermal Engineering. 2009. V. 56, № 8. P. 636–643.
- *Brezgin V. I., Brodov Yu. M., Chubarov A. A., Brezgin D. V.* Modern Technologies for Rendering Information Support to Cogeneration Steam Turbine Units in Their Design and Operation Stages // Thermal Engineering. 2013. V. 60, № 8. P. 573–579.

DEVELOPMENT OF SPECIAL-PURPOSE ELECTROMAGNETIC AND ELECTROMECHANICAL CONVERTORS OF ENERGY

Department of Electrical Machinery

The program is aimed at the development of electromagnetics convertors, operated under the conditions of high-level radioactivity and high temperatures (up to 250-300 C).

Dr. Anatoly Plastun
Head of Department, DSc, Professor

Research interests:

- Unconventional methods of directional generation of excitation fields in magnetic convertors of energy.
- Unconventionally combined structures of brushless excitation systems for synchronous machines.
- Electrical motors of special configuration.

Main publications:

- *Plastun A.* Development And Application Of New Generation Of Multi-Functional Brushless Exiting Devices With Non-Conventional Combination Methods / A. Plastun, V. Denisenko, A. Moiseichenkov // Published by the University of West Bohemia in Pilsen "ISTET 2013" – Internationai Symposium on Theoretical Electrical Engineering – Pilsen, Czech Republic, 24th–26th June. 2013. P. IV15–IV16. ISBN 978-80-261-0246-5.
- *Plastun A.* Synthesis And Properties Direct Shaping Of An Additive Subset Of Non-Conventional Combined Independent Brushless Exciting Devices For Synchronous Generators // Published by the University of West Bohemia in Pilsen "ISTET 2013 – Internationai Symposium on Theoretical Electrical Engineering – Pilsen, Czech Republic, 24th–26th June. 2013. P. IV65–IV66. ISBN 978-80-261-0246-5.
- *Anatoly Plastun, Victor Denisenko, Sergey Avdeev, Pavel Pupyrev, Alexey Yarovoi.* Leakage Inductive Reactances of Stator Winding of Induction Motors with Asymmetric Magnetic Circuit // 6th International conference on unconventional electromechanical and electrical systems. Alushta, Ukraine, September 24–29, 2004.

RESEARCH AND DEVELOPMENT OF SYNCHRONOUS GENERATORS WITH BRUSHLESS EXCITATION SYSTEMS

Department of Electrical Machinery

The program is aimed at the research of the operation features of brushless excitation systems constructed using combined multifunctional brushless exciters in different operation conditions of synchronous generators.

Dr. Victor Denisenko
DSc, Professor

v.i.denisenko@urfu.ru

Research interests:

- Development of synchronous machines with unconventionally combined brushless exciters of new generation.
- Development of new A.C. motor constructions with unconventional magnetic field generation.
- Development of permanent magnet synchronous motors.
- Thermal calculations for electromechanical convertors.

Main publications:

- *Plastun A.* Development And Application Of New Generation Of Multi-Functional Brushless Exiting Devices With Non-Conventional Combination Methods / A. Plastun, V. Denisenko, A. Moiseichenkov // Published by the University of West Bohemia in Pilsen "ISTET 2013" – Internationai Symposium on Theoretical Electrical Engineering – Pilsen, Czech Republic, 24th–26th June. 2013. P. IV15–IV16. ISBN 978-80-261-0246-5.
- *Plastun V. Denisenko A. Moiseichenkov A.* Shipitsin. Note on measurability of instantaneous speed of combined multifunctional brushless exciter // Proceedings of the 6th Conference on "Unconventional Electromechanical and Electrical Systems", 24–29 September 2004, Alushta, the Crimea, Ukraine. SZCZECIN, 2004. P. 379–384.
- *Radchenko Y., Ryabov M., Pekerman G., Chernyshov V., Elbert S., Plastun A., Denisenko V.* Generators for diesel and gas-turbine power plants and hydrogenerators with brushless excitation systems of nonconventional design for low-power plants // Proceedings of the 6th Conference on "Unconventional Electromechanical and Electrical Systems", 24–29 September 2004, Alushta, the Crimea, Ukraine. SZCZECIN, 2004. P. 755–760.

ELECTROMECHANICAL MOTION CONTROL SYSTEMS

Department of Electric Drives and Industrial Installations Automation

The program is focused on the development and research of electromechanical motion control systems on the basis of AC and DC electric drives.

Dr. Anatoly Ziuzev
Professor, Doctor of Technical Sciences

a.m.zyuzev@urfu.ru

Research interests:

- Simulation of electric drives and technological machines and mechanisms, including real-time simulation.
- Analysis and optimization of the electric drive behavior for energy datum.
- Development and research of electrified transport systems.
- Development of expert systems for the assessment of the state of machine units on the basis of the variables of the electric drive.

Main publications:

- *Ziuzev A. M., Nesterov K. E., Mudrov M. V.* The software-hardware simulator of the electric drive // Power Elect.ronics and Applications (EPE'14-ECCE Europe). 16th European Conference. 2014.
- DOI: 10.1109/EPE.2014.6911018
- *Ziuzev A. M., Nesterov K. E., Mudrov M. V.* Simulator for Electric Drives Research. Applied Mechanics and Materials. 2015. V. 698. P. 12–18. Trans Tech Publications, Switzerland.
- DOI: 10.4028/www.scientific.net/AMM.698.12
- *Zyuzev A. M., Nesterov K. E., Mudrov M. V.* A hardware–software complex for real-time modeling of electric drives. Russian Electrical Engineering. 2014. V. 85 (9). P. 591–596.
- DOI: 10.3103/S1068371214090119
- *Kostygov A. M., Ziuzev A. M., Solodky E. M., Kukharchuk A. V., Mudrov M. V., Nesterov K. E.* STATUS AND PROSPECTS use of hardware and software simulators Electrotechnical complexes. Russian Electrical Engineering, 2015.

ELECTROMECHANICAL MOTION CONTROL SYSTEMS

Department of Electrical Machinery

The program is focused on the development and research of electromechanical motion control systems on the basis of AC and DC electric drives.

Dr. Vladimir Polyakov
Professor, Doctor of Technical Sciences

v.n.polyakov@urfu.ru

Research interests:

- Energy-efficient modes of variable speed electric drives.
- The development of energy-efficient control algorithms for AC electric drives.
- Mathematical modeling of elements of variable frequency drives power part.
- Mathematical modeling of control systems and modes of variable frequency drives.

Main publications:

- *Polyakov V. N.* Dynamic properties of the torque-control system in an electric drive with a double-fed asynchronous machine // Russian Electrical Engineering. 2014. V. 85 (9). P. 549–553. DOI: 10.3103/S1068371214090089
- *Polyakov V. N.* Dynamics of an electric drive with a double-fed asynchronous machine under vector control // Russian Electrical Engineering. 2014. V. 85 (9). P. 543–548. DOI: 10.3103/S1068371214090077
- *Polyakov V. N.* Evaluation of energy efficiency of motor control modes in adjustable electric drives // Russian Electrical Engineering. 2009. V. 80 (9). P. 486–490. DOI: 10.3103/S1068371209090041
- *Borodin M. Y., Polyakov V. N.* Optimization of modes of electric drive with generalized AC motor // Russian Electrical Engineering. 2009. V. 80 (9). P. 511–516. DOI: 10.3103/S1068371209090090

INVESTIGATION OF FLOW DISTRIBUTION AND ELECTRIC POWER LOSSES IN POWER GRID

Department of Thermal Energy and Engineering

The program is focused on the study of flow distribution in hydro and heat networks, at using of new heat and pump equipment (boilers etc).

Dr. Vladimir Munts
Head of Department,
Professor, Doctor of
Technical Science

Research interests:

- Modeling of the heat power processes.
- Examination of nitrogen oxides formation during coals combustion.
- Investigation at high temperature processes in heat fuel elements.

Main publications:

- *Munts V., Munts Y., Proshin A., Khudyakova V.* Formation and reduction of nitrogen oxides in the combustion of fuels in a circulation fluidized bed / Energy production and Management in the 21st Centry. 2014. V. 2 P. 1173–1182.

TECHNOLOGICAL TRANSPORT SYSTEMS BASED ON LINEAR ELECTRIC DRIVE

Department of Electric Engineering and Electrotechnology Systems

The program is aimed at studying the problems of the development of linear transport systems on the basis of linear synchronous and asynchronous motors for industrial and passenger transport.

Dr. Fedor Sarapulov
Doctor of Technical Sciences, Professor

sarapulovfn@yandex.ru

Research interests:

- Constructions and modes of operation of transport systems on the basis of linear synchronous and asynchronous electric motors, induction systems of technological transport of conductive fluids (molten metals). Electrodynamic processes in multi-layer massive conductive secondary elements; calculations of thermal processes and design of cooling systems in unequally loaded linear motors; numerical modeling of electromagnetic and thermal processes in induction devices with non-continuous magnet cores on the basis of detailed equivalent circuit.

Main publications:

- *Dmitrievskii V., Pracht V., Sarapulov F.* Finite element based simulation ofHYPERLINK "http://youthscience.urfu.ru/node/5356" induction heating the moving cylindrical ferromagnetic billets // Acta Technica. № 59. P. 9–16. 2014.
- *Prakht V. A., Dmitrievskii V. A., Sarapulov F. N., Dmitrievskii A. A Safin N. R.* Computer-based modeling ofHYPERLINK "http://youthscience.urfu.ru/node/5355" moving cylindrical ferromagneticHYPERLINK "http://youthscience.urfu.ru/node/5355" billets induction heating / COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engin. № 33. P. 273–285, 2014. Article.
  DOI: 10.1108/COMPEL-09-2012-0182
- *Dmitrievskii V. A., Prakht V. A., Sarapulov F. N., Klimarev V. A.* A finite element model of electric machine with flux switching-over for studying the dynamic operation modes // Russian Electrical Engineering 2012. 83 (3). P. 126–131.
- *Fatkullin S. M., Frizen V. E., Sarapulov F. N., Idiyatulin A. A.* One-dimensional dynamic model of induction crucible furnace // Russian Electrical Engineering. V. 81. Is. 5. May 2010. P. 254–258.

ELECTRODYNAMIC SEPARATION OF PROCESS WASTES

Department of Electric Engineering and Electrotechnology Systems

The program is aimed at the development and study of electrodynamic separation of metal-containing process wastes.

Dr. Andrey Konyaev
Doctor of Technical Sciences, Professor

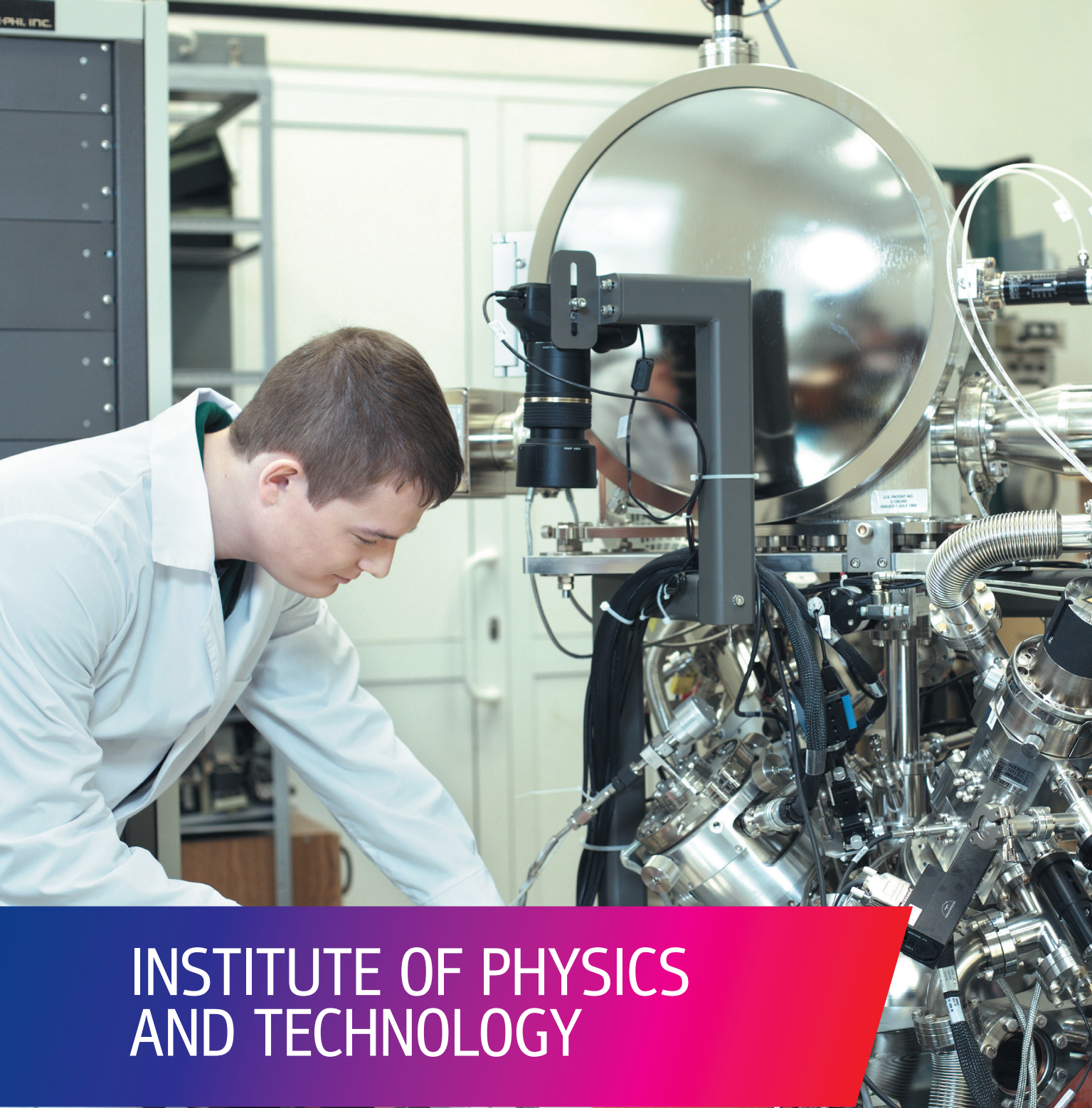
a.u.konyaev@urfu.ru

Research interests:

- Improvement of constructions of the devices for electrodynamic and magnet separation of process and solid domestic wastes; numerical modeling of electromechanical processes in electrodynamic separators; studies of influence of various factors on the dynamics of the waste recovery process.

Main publications:

- *Konyaev A. Yu., Nazarov S. L.* Electrodynamic separators based on linear inductors with diverging magnetic fields // Russian Electrical Engineering. 2013.
- *Konyaev A. Yu., Konyaev I. A., Kuznetsov K. V.* Electrodynamic separators with a rotating magnetic field // Russian Electrical Engineering. 2007.
- Ways for improving the energy efficiency of electrodynamic situation / A. Yu. Konyaev, A. M. Akulinin, A. Yu. Barsukov, A. V. Sokolov // Izvestiya Vysshikh Uchebnykh Zavedenii, Gornyi Zhurnal. 2003.



INSTITUTE OF PHYSICS AND TECHNOLOGY

The Institute of Physics and Technology has at its disposal well-equipped research laboratories and highly qualified scientists. This helps to maintain a high level of scientific research and opens up wide opportunities for prospective studies of young researchers.

The main directions of the scientific work at the Institute are:

- Technologies and materials of nuclear energy.
- Ab initio simulations of new materials.
- Radiation physics of functional materials.
- Radiation and nuclear technologies.
- Ion-beam and plasma technology to create new functional materials and surfaces.
- Spectroscopy of disordered systems.

Our Institute actively cooperates with the Russian Academy of Sciences and the industry, and implements large-scale projects commissioned by the state. At the same time we pay special attention to working with young scientists and providing them with comprehensive support. The Institute holds an annual international scientific conference for young researchers "Physics. Tech. Innovation". Every year more than 10 young scientists of the Institute are awarded PhD degrees. We work continuously on searching for funding to provide young scientists with the opportunities of undergoing internships in the best universities and laboratories all over the world.

I cordially invite young researchers to join our team!

Dr. Vladimir Rychkov,
Director of the Institute

ABOUT THE INSTITUTE

Ural Federal University
named after the first President of Russia B.N.Yeltsin
Institute of Physics and Technology

UrFU Institute of Physics and Technology is comprised of several departments: Rare Metals and Nanomaterials, Technical Physics, Experimental Physics, Theoretical Physics and Applied Mathematics, Electrophysics, Physical Methods and Instruments of Quality Control, Computer Science, Physical and Chemical Analysis Methods, Radiochemistry and Industrial Ecology, Physics of High-Energy Processes.

The key areas of research at the Institute include condensed state physics, chemistry and technology of rare elements and materials for nuclear power plants, biomedical physics and radioecology.

The Institute also possesses unique equipment for research and modification of material properties, including the 24 MeV cyclotron.

The Institute's graduates make up the core of the Institutes of the Ural Branch of the Russian Academy of Sciences, research laboratories of industrial corporations, and science intensive businesses. Many of the Institute's graduates work successfully in the hi-tech industries, chemical testing and environmental laboratories, clinical diagnosis and medical genetics centers and laboratories.

DOCTORAL STUDIES AT THE IPT

UrFU Institute of Physics and Technology offers a wide range of Doctoral Programs in the fields of Physics and Chemical Technologies . In this brochure, you will find a brief description of the Institute's departments and its Doctoral Programs, along with the information about the thesis advisors.

We offer:

- 4 year Doctoral Programs.
- Accommodation in a University dormitory.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Free Russian language courses.
- The possibility to defend the Candidate of Science* theses or an UrFU PhD thesis.

*The first doctoral degree in Russia (Kandidat Nauk). It is gained after 3 to 5 years in a post-graduate school. The qualification requirements include mandatory publications in peer reviewed journals and approval on the Federal government level.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- B2 level of English or Russian.
- Interview.

For further information, please contact:

Dr. Igor Antsygin,
Deputy Director for Science
i.n.antsygin @urfu.ru

ANALYTICAL CONTROL OF NATURAL AND TECHNICAL OBJECTS

Department of Physical and Chemical Analysis

The program is focused on training specialists in effective experimental and theoretical methods for analytical control of isotopic and elemental composition of natural and technical objects.

Dr. Aleksandr Pupyshev
Professor, Chief editor
of the scientific journal
"Analysis and control"

pupyshev@gmail.com

Main research areas:

- The study of the mechanism of formation of ions, atoms and molecules.
- Management of thermochemical processes in the sources of atomization, ionization and excitation spectra.
- Thermodynamic modeling of thermochemical processes in spectral sources.

Research interests:

- Isotopic, elemental, molecular and structural analysis.
- Thermodynamic modeling of thermochemical processes in low-temperature plasma.

Main publications:

- *Ganeev A. A., Pogarev S. E., Pupyshev A. A., Sholupov S. E.* Atomic absorption analysis. Sanct-Peterburgs: Izdatel'stvo "Lan'", 2010. 250 p. (in Russian).
- *Pupyshev A. A.* Practical course atomic absorption analysis: lectures. Ekaterinburg: UGTU-UPI, 2009. 442 p. (in Russian).
- *Zmitrevich A. G., Pupyshev A. A.* Atomic emission spectral analysis of ferroalloys. Ekaterinburg: UGTU-UPI, 2009. 269 p. (in Russian).
- *Pupyshev A. A.* Atomic absorption spectral analysis. M.: Technosphera, 2009. 784 p. (in Russian).
- *Pupyshev A. A., Surikov V. T.* Mass spectrometry with inductively coupled plasma. Formation of ions. Ekaterinburg: Izdatel'stvo UrO RAN, 2006. 276 p. (in Russian).
- *Pupyshev A. A., Danilova D. A.* Atomic emission spectral analysis with inductively coupled plasma and glow discharge by Grimm. Ekaterinburg: UGTU-UPI, 2002. 202 p. (in Russian).

MAGNETOACOUSTIC AND LOW TEMPERATURE ULTRASONIC PHENOMENA IN SOLIDS

Department of Experimental Physics

The objective of the program is the experimental study of the properties of crystals using ultrasonic methods.

Dr. Vladimir Gudkov
Professor of Department of Experimental Physics

vlgud@yandex.ru

Research interests:

- Ultrasonic analogue of the Faraday effect in metallic and magnetic crystals.
- The Jahn-Teller effect in crystals with anisotropic point defects: transition metal ions and vacancies. Mechanisms of relaxation. Parameters and symmetry properties of adiabatic potential energy surface of the Jahn-Teller complexes.
- Thermodynamic properties of dielectrics and semiconductors.

Main publications:

- *Gudkov V. V., Gavenda J. D.* Magnetoacoustic Polarization Phenomena in Solids. Springer-Verlag, New York. 2000. 218 p.
  HTTP://www.abebooks.co.uk/Magnetoacoustic-Polarization-Phenomena-Solids-Gudkov-V.-Gavenda/8208162191/bd
- *Gudkov V. V.* Ultrasonic consequences of the Jahn-Teller effect / The Jahn-Teller Effect. Eds.: H. Koppel, D. R. Yarkony, H. Barentzen, Heidelberg, Springer. 2009. P. 743–766.
  DOI: 10.1007/978-3-642-03432-9_23
- *Gudkov V. V., Bersuker I. B.* Experimental Evaluation of the Jahn-Teller Effect Parameters by Means of Ultrasonic Measurements. Application to Impurity Centers in Crystals / Vibronic Interactions and the Jahn-Teller Effect: Theory and Applications. Heidelberg: Springer. 2012. P. 143–162.
  DOI: 10.1007/978-94-007-2384-9_7

Entry requirements:

- Knowledge of background of solid state physics.

FIRST-PRINCIPLES MODELING OF MAGNETIC EXCITATIONS IN MOLECULAR MAGNETS

Department of Theoretical Physics and Applied Mathematics

Molecular magnets, Mn12, V15, Fe8 and others, are natural ensembles of identical, weakly-interacting magnetic nanoparticles. Its study (starting from the beginning of 1990th) has resulted in a real breakthrough in the field of nanomagnetism. Numerous quantum effects such as magnetic tunneling, Berry phase, etc. have been observed.

The proposed project combines the first-principles methods for description of the ground state and model spin Hamiltonian approaches for simulating the magnetic excitations in molecular magnets. The main focus will be on a complete first-principle calculation of intramolecular magnetic interactions (Heisenberg exchange, DM, and anisotropy). Another important issue will be the diagonalization of the constructed spin Hamiltonians and calculations experimentally observed dependencies.

Dr. Vladimir Mazurenko

v.v.mazurenko@urfu.ru

Research interests:

- Magnetic interactions.
- Dynamical mean-field theory.
- First-principles calculations.

Main publications:

- *Mazurenko V. V., Kvashnin Y. O., Fengping Jin, De Raedt H. A., Lichtenstein A. I., Katsnelson M. I.* First-principles modeling of magnetic excitations in Mn12 // Phys. Rev. B 89. 214422.
  DOI: 10.1103/PhysRevB.89.214422
- *Vladimir V. Mazurenko, Maria V. Valentyuk, Raivo Stern, and Alexander A. Tsirlin/* Nonfrustrated interlayer order and its relevance to the Bose-Einstein condensation of magnons in BaCuSi2O6 // Phys. Rev. Lett. 112. 2014. 107202.
  DOI: 10.1103/PhysRevLett.112.107202

Entry requirements:

- Experience in first-principles methods based on the density functional theory is required.

NANOSTUCTURED WIDEGAP MATERIALS FOR OPTOELECTRONICS AND PHOTONICS

Department of Physical Techniques and Devices for Quality Control

The program focuses on the development of functional solid state elements based on nanostructured widegap materials – nanoporous and nanotubular oxides, nitrides powders and nanowhiskers, semiconductor quantum dots, nanocomposites etc. The students will have access to modern analytical and technological equipment.

Dr. Ilya Weinstein
Professor, Head of NANOTECH Centre

i.a.weinstein@urfu.ru

Research interests:

- Optical and luminescent properties of solids, basic mechanisms of stimulated processes in bulk and nanosized widegap materials.

Main publications:

- *Weinstein I. A., Vokhmintsev A. S., Spiridonov D. M.* Thermoluminescence kinetics of oxygen-related centers in AlN single crystals // Diamond & Related Materials. 2012. V. 25. P. 59–62.
  DOI: 10.1016/j.diamond.2012.02.004
- *Vokhmintsev A. S., Weinstein I. A., Kamalov R. V., Dorosheva I. B.* Memristive effect in a nanotubular layer of anodized titanium dioxide // Bulletin of the Russian Academy of Sciences. Physics. 2014. V. 78, № 9. P. 932–935.
  DOI: 10.3103/S1062873814090317
- *Vokhmintsev A. S., Weinstein I. A., Chaikin D. V.,Fedorov M. D.,Afonin Yu. D.* Blue electroluminescence from AlN nanowhiskers // Technical Physics Letters. 2015. V. 41, № 4. P. 332–335.
  DOI: 10.1134/S1063785015040161

Entry requirements:

- Experimental experience and motivation to do experimental research in materials science.
- Basic knowledge of solid state physics.
- Computer simulation skills.

ELECTRONIC EXCITATION AND STRUCTURE OF LUMINESCENTMATERIALS

Department of Experimental Physics

The objective of the program is the study of electronic excitations, electronic structure and defects in luminescent and optical materials both doped and undoped with rare-earth ions, using various experimental techniques.

Dr. Igor Ogorodnikov
Professor of Experimental Physics Department

Research interests:

- Characterization of luminescent and optical materials (BeO, Y2O3, LiB3O5, Li2B4O7, β-BaB2O4,CsLiB6O10, Li6Re(BO3)3 (Re=Gd,Y,Eu), KB5, KAB0, KBBF, APb2X5 (A=K,Rb; X=Cl,Br), SrAlF5, SrI2, LiF, NaF, ADP, KDP, DKDP and so on) undoped and doped with rare-earth ions. Methods of characterization: optical and luminescence spectroscopy with nanosecond time-resolution under excitation with photons (visible -UV-VUV-XUV), electron and ion beams, x-rays; thermoluminescence; ESR, EPR; computer simulations of actual processes; nuclear physics methods of analysis, see in detail at: HTTP://www.researcherid.com/rid/B-4162-2011.

Main publications:

- *Ogorodnikov I. N., Kiseleva M. S., Vostrov D. O., Yakovlev V. Yu.* Cathodoluminescence kinetics of Li6GdB3O9 crystals // Journal of Luminescence. 2015. V. 158. P. 252–259.
  DOI: 10.1016/j.jlumin.2014.10.011
- *Yavetskiy R. P., Baumer V. N., Danylenko M. I., Doroshenko A. G., Ogorodnikov I. N., Petrusha I. A., Tolmachev A. V., Turkevich V. Z.* Transformation-assisted consolidation of Y2O3:Eu3+ nanospheres as a concept to optical nanograined ceramics // Ceramics International. 2014. V. 40. P. 3561–3569.
  DOI: 10.1016/j.ceramint.2013.09.072

Entry requirements:

- Knowledge of luminescence, spectroscopy, condensed matter physics, radiation physics.

MÖSSBAUER SPECTROSCOPY WITH A HIGH VELOCITY RESOLUTION AND ITS APPLICATIONS IN BIOMEDICAL, COSMOCHEMICAL AND NANOSTRUCTURED MATERIALS RESEARCH

Department of Experimental Physics
Department of Physical Techniques and Devices for Quality Control

Investigation of the relationship of small variations in the iron local microenvironment and electronic structure and properties of biomolecules, microcrystals of meteorites and nanostructured materials on the basis of the ^{57}Fe hyperfine parameters using Mössbauer spectroscopy with a high velocity resolution.

Dr. Michael Oshtrakh
Doctor of Sciences, chief researcher

oshtrakh@gmail.com

Research interests:

- Development of Mössbauer spectroscopy with a high velocity resolution and multidimensional Mössbauer spectrometry.
- Biomedical applications of Mössbauer spectroscopy.
- Applications of Mössbauer spectroscopy in the study of meteorites.
- Application of Mössbauer spectroscopy in the study of nanostructured materials.

In 2014 the doctoral thesis by Amit Kumar (University of Delhi South Campus) was prepared and defended under co-supervision of Dr. M.I. Oshtrakh.

Main publications:

- *Oshtrakh M. I., Semionkin V. A.* Mössbauer Spectroscopy with a High Velocity Resolution: Advances in Biomedical, Pharmaceutical, Cosmochemical and Nanotechnological Research. Spectrochim. Acta, Part A: Molec. and Biomolec. Spectroscopy. 2013. 100, 78–87.
  DOI: 10.1016/j.saa.2012.03.020
- *Oshtrakh M. I., Berkovsky A. L., Kumar A., Kundu S., Vinogradov A. V., Konstantinova T. S., Semionkin V. A.* Heme Iron State in Various Oxyhemoglobins Probed Using Mössbauer Spectroscopy with a High Velocity Resolution. BioMetals, 2011. 24. 501–512.
  DOI: 10.1007/s10534-011-9428-3

SPECTROSCOPY OF FUNCTIONAL MATERIALS

Department of Experimental Physics

The objective of the program is the study of electronic structure, defects and energy transfer of electron excitations in functional optical materials based on oxide and complex fluoride crystals as well as thin films, using various experimental methods.

Dr. Vladimir Pustovarov
Professor of Department of Experimental Physics

v.a.pustovarov@urfu.ru

Research interests:

- Characterization of luminescent and optical materials (Al2O3, Hf2O3, Li3AlF6, LiBaAlF6, Li6Re(BO3)3 (Re=Gd,Y,Eu), APb2X5 (A=K,Rb; X=Cl,Br), SrAlF5, SrI2, LaBr3 and so on) undoped and doped with rare-earth ions. Methods of characterization: absorption and luminescence spectroscopy with nanosecond time-resolution under excitation with photons (visible -UV-VUV, including synchrotron radiation), electron and X-ray beams; thermoluminescence; nuclear physics methods of analysis.

Main publications:

- *Pustovarov V. A., Kortov V. S., Zvonarev S. V., Medvedev A. I.* Luminescent Vacuum Ultraviolet Spectroscopy of Cr3+ ions in Nanostructured Aluminium Oxide // Journal of Luminescence. 2012. V. 132. Is. 11. P. 2868–2873. DOI: 10.1016/j.jlumin.2012.06.001
- *Pustovarov V. A., Ivanov V. Yu., Vyprintsev D. I., Shvalev N. G.* Time-Resolved Photoluminescence of LaBr3:Ce Scintillation Crystals under Ultrasoft X-Ray Excitation // Technical Phys. Letters. 2012. V. 38, № 9. P. 784–788. DOI: 10.1134/S1063785012090106
- *Vladimir Pustovarov, Igor Ogorodnikov, Erbol Ospanbekov* Optical and electronic properties of undoped La2Be2O5 single crystals in the far ultraviolet energy range // Journal of the Optical Society of America B: Optical Physics. 2015. V. 32. № 2. P. 241–247. DOI: 10.1364/JOSAB.32.000241

Entry requirements:

- Basic knowledge of solid state physics, luminescence, spectroscopy methods, radiation physics.

STRUCTURE AND PHYSICAL PROPERTIES OF THE METEORITES

Department of Physical Techniques and Devices for Quality Control

This program focuses on the experimental study of physical properties, structure and fracture features of extraterrestrial substance. The student will have access to modern analytical equipment in NANOTECH UrFU.

Dr. Victor Grokhovsky
Professor

grokh47@mail.ru

Research interests:

- The phase and structure transformations in the metal of meteorites..

Main publications:

- *Grokhovsky V. I., Bevan A. W. R.* Plessite formation by discontinuous precipitation reaction from γ-Fe,Ni in Richardton (H5) ordinary chondrite // Nature. 1983. V. 301, № 5898. P. 322–324.
  DOI: 10.1038/301322a0
- *Popova O. P., Jenniskens P., Emel'yanenko V., Kartashova A., Biryukov E., Khaibrakhmanov S., Shuvalov V., Rybnov Yu., Dudorov A., Grokhovsky V. I., Badyukov D. D., Yin Q.-Z., Gural P. S., Albers J., Granvik M., Evers L. G., Kuiper J., Kharlamov V., Solovyov A., Rusakov Y. S., Korotkiy S., Serdyuk I., Korochantsev A. V., LarionovM. Yu., Glazachev D., Mayer A. E., Gisler G., Gladkovsky S. V., Wimpenny J., Sanborn M. E., Yamakawa A., Verosub K. L., Rowland D. J., Roeske S., Botto N. W., Friedrich J. M., Zolensky M. E., Le L., Ross D., Ziegler K., Nakamura T., Ahn I., Lee J. I., Zhou Q., Li X.-H., Li Q.-L., Liu Y., Tang G.-Q., Hiroi T., Sears D., Weinstein I. A., Vokhmintsev A. S., Ishchenko A. V., Schmitt-Kopplin P., Hertkorn N., Nagao K., Haba M. K., Komatsu M., Mikouchi T.* Chelyabinsk airburst, damage assessment, meteorite recovery, and characterization // Science. 2013. V. 342. P. 1069–1073.
  DOI: 10.1126/science.1242642
- *Kohout T., Gritsevich M., Grokhovsky V. I., Yakovlev G. A., Haloda J., Halodova P., Michallik R. M., Penttila A., Muinonen K.* Mineralogy, reflectance spectra, and physical properties of the Chelyabinsk LL5 chondrite – insight into shock-induced changes in asteroid regoliths // Icarus. 2014. V. 228. P. 78–85.
  DOI: 10.1016/j.icarus.2013.09.027

INSTITUTE OF RADIOELECTRONICS AND INFORMATION TECHNOLOGIES

High-quality education in the fields of Radio Engineering and Information Technologies has always been relevant and important. These fields tend to be developing very quickly; hardware and software generations are constantly changing. The Institute of Radioelectronics and Information Technologies holds leading positions in the spheres of image processing, microstrip antennas and antenna arrays design, parallel algorithms construction for solving the linear systems of equations in inverse geophysical problems and development of software packages for efficient computing on parallel computing systems, decision support of business processes, logistic and manufacturing based on system analysis, simulation and intelligent systems.

We invite all researchers interested in Radioelectronics and Information Technologies to pursue their doctoral studies in the Institute of Radioelectronics and Information Technologies at Ural Federal University.

The Institute of Radioelectronics and Information Technologies is one of the leaders in the sphere of research among the UrFU Institutes. We implement a lot of projects for the major regional enterprises. Currently the Institute works on developing the meteorological monitoring system for the new space-launch complex Vostochny in the east of Russia.

The Institute of Radioelectronics and Information Technologies offers all the necessary conditions for doctoral students to pursue their studies in the fields of Radio Engineering, Telecommunications, Information Technologies and Applied Mathematics. Research advisors of the doctoral programs are the leading researchers in their fields.

Dr. Sergey Knyazev,
Director of the Institute

ABOUT THE INSTITUTE

Ural Federal University

named after the first President of Russia B.N.Yeltsin

Institute of Radioelectronics and Information Technologies

The Institute of Radioelectronics and Information Technologies offers a wide-range of full-time and part-time programs, alongside with accelerated and distance learning programs. Training is carried out both on fee-paying and state-funded bases.

The IRIT collaborates with the leading companies in the region and in the country within the frames of various research projects. This mutually beneficial cooperation helps to maintain the advanced level of equipment of the Institute's laboratories and computer classes. Close ties with employers allows the students undergoing internships and practical trainings in the major companies of Ekaterinburg and the Sverdlovsk region. Annually the Institute organizes a job fair bringing together hundreds of companies.

The best graduates of the Institute continue their studies as postgraduates enrolled to the doctoral programs implemented by UrFU and the Ural Branch of the Russian Academy of Sciences.

Currently there are 2200 students studying at 9 departments. The teaching staff consists of 254 members, including 14 academicians and corresponding members of different Academies of Sciences, 27 Doctors and 127 Candidates of Sciences.

DOCTORAL STUDIES AT THE IRIT

The Institute of Radioelectronics and Information Technologies offers a wide range of Doctoral Programs in the fields of:

- Radio Engineering.
- Telecommunications.
- Computer Sciences.
- Information Technologies and Applied Mathematics.

In this brochure you will find a brief description of the Doctoral Programs, alongside with the information about the thesis advisors.

We offer:

- 3 or 4 year Doctoral Programs offering an option of defending a Candidate of Science or a PhD thesis.
- Accommodation in a University dormitory.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Russian language courses.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian (B2).
- Interview.

For further information, please contact:

Dr. Leonid Dorosinsky,
Deputy Director for Science
l.g.dorosinskiy@urfu.ru

CLASSICAL AND QUANTUM INFORMATION TECHNOLOGIES

Department "Theoretical Foundation of Radioelectronics"

The program focuses on the analysis and synthesis of fast classical and superfast quantum signal and image processing algorithms.

The range of research subjects covered by the program includes: quantum computers and quantum computing, quantum multichannel image processing, excitable Schrodingers's metamedium for image processing, quantum pattern recognition, quantum neural networks, classical and quantum signal and system theories, abstract harmonic analysis of signals and systems on hypergroups, fast classical and superfast quantum Fourier-Clifford transforms on Abelian and non-Abelian groups.

The students will have the opportunity to conduct research for their PhD thesis and to participate in different research projects.

Dr. Valeriy Labunets
Professor, Director of Center of Excellence for Quantum and Video Information Technologies

vlabunets05@yahoo.com

Research interests:

- Quantum computers and quantum computing.
- Clifford algebra as a unified language for image processing, pattern recognition and quantum physics; Brain as Clifford algebra quantum computer.
- Digital multichannel image processing.
- Superfast quantum unitary transforms; Classical and quantum signal and system theories; Abstract harmonic analysis of signals and systems on hypergroups.
- Fast classical and superfast quantum Fourier-Clifford transforms on Abelian and non-Abelian groups; Fast number theoretical transforms; Fast Radon transforms.

Main publications:

- *Labunets V. G., Rundblad E. V., Astola J.* Is the Brain a "Clifford Algebra Quantum Computer?" // Applications of Geometric Algebra in Computer Science and Engineering. Editors: L. Dorst, C. Doran, J. Lasenby, Birkhauser 2003. P. 285–296.
- *Rundblad E., Labunets V., Novak P.* Generalized Classical and Quantum Signal Theory on Abelian Groups and Hypergroups. Proc. of SPIE Quantum information and Computation III. Orlando, Florida, USA. 29–30 March 2005. V. 5815. P. 235–246.

CLIFFORD ALGEBRA AS A UNIFIED LANGUAGE FOR IMAGE PROCESSING AND PATTERN RECOGNITION

Department "Theoretical Foundation of Radioelectronics"

The program focuses on the applications of Clifford algebra in signal and image processing. The range of research subjects covered by the program includes: generalized Clifford algebra, codes over Clifford algebras, public key criptosystems based on linear codes over Clifford algebras, fast classical and superfast quantum Fourier-Clifford transforms on Abelian and non-Abelian groups, fast invariant algorithms of multichannel 2D and 3D image recognition, excitable Clifford-Schrodingers's metamedium for image processing.
The students will have the opportunity to conduct research for their PhD thesis and to participate in different research projects.

Dr. Valeriy Labunets
Professor, Director of
Center of Excellence
for Quantum and Video
Information Technologies

vlabunets05@yahoo.com

Research interests:

- Quantum computers and quantum computing.
- Clifford algebra as a unified language for image processing, pattern recognition and quantum physics; Brain as Clifford algebra quantum computer.
- Digital multichannel image processing.
- Superfast quantum unitary transforms; Classical and quantum signal and system theories; Abstract harmonic analysis of signals and systems on hypergroups.
- Fast classical and superfast quantum Fourier-Clifford transforms on Abelian and non-Abelian groups; Fast number theoretical transforms; Fast Radon transforms..

Main publications:

- *Labunets V. G., Rundblad E. V., Astola J.* Is the Brain a "Clifford Algebra Quantum Computer?"/ / Applications of Geometric Algebra in Computer Science and Engineering. Editors: L. Dorst, C. Doran, J. Lasenby, Birkhauser 2003. P. 285–296.
- *Rundblad E., Labunets V., Novak P.* Generalized Classical and Quantum Signal Theory on Abelian Groups and Hypergroups. Proc. of SPIE Quantum information and Computation III. Orlando, Florida, USA. 29–30 March 2005, V. 5815, P. 235–246.

HIGH FREQUENCY DEVICES AND ANTENNAS

Department of High Frequency Radio and TV Equipment

The main objective of the program is to improve and develop new methods of microwave equipment and antennas design. This program is focused on training specialists in electromagnetics, microwave devices, antennas, antenna arrays, radiowave propagation and electromagnetic scattering. The Green's function method is used for flat, cylindrical and spherical layered magnetodielectric structures analysis.

Dr. Sergey Shabunin
Professor

s.n.shabunin@urfu.ru

Research interests:

- Electromagnetic theory and techniques, microstrip antennas and antenna arrays, antenna radomes, metamaterials using in microwave devices, electromagnetic scattering.

Main publications:

- *Karpov A., Knyazev S., Shabunin S.* A New Technique for Sandwich Antenna Radomes Analysis / 2014 Loughborough Antennas and Propaga-tion Conference (LAPC) 10-11.11.2014. Loughborough, UK. P. 325–328.
- *Abdullin R., Knyazev S., Lesnaya L., Shabunin S.* Analysis of Partially Dielectric-Filled Rectangular Waveguide with Transverse Slots Using Green's Function Method // Proceedings of the 7th European Conference on Antennas and Propagation EuCAP 2013, 8–12 April, 2013, Gothenburg, Sweden. CD. P. 3570–3574.
- *Knyazev S., Lesnaya L., Shabunin S.* Green's functions of multilayered cylindrical structures and their application forradiation, propagation and scattering problems solving // 2011 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference : Program and Book of Abstracts. Natal, Brazil. October 29 – November 01, 2011. P. 59.
- *Knyazev N., Panchenko B., Shabunin S.* Using of double-positive and double-negative materials for minimization of Stratton-Chu antenna size // Proceedings of the 5th European Conference on Antennas and Propagation (EUCAP). 11–15 April 2011, Rome, Italy. CD. P. 1582–1583.

RADIO SYSTEMS OF EXTREMELY HIGH FREQUENCY BAND

Department of Radioelectronic and Telecommunication Systems

This program aims to study the features of autodyne effect in the variety of self-oscillating millimeter-wave systems under the influence of its own reflected radiation or radiation from an external source. This kind of oscillators is used in different radar and telecommunication systems.

Dr. Vladislav Noskov
Supervisor, Professor

noskov@oko-ek.ru

Research interests:

- Short-range radar systems, self-oscillating systems and autodynes, vibration theory in radio, Reception devices and antenna systems for radars and communications, history of the radio engineering.

Main publications:

- *Noskov V. Ya., Ignatkov K. A.* Dynamic features of autodyne signals // Russian Physics Journal. 2013. V. 56, № 4. P. 420–428.
  DOI: 10.1007/s11182-013-0051-3.
- *Noskov V. Ya., Ignatkov K. A.* Peculiarities of noise characteristics of autodynes under strong external feedback // Russian Physics Journal. 2013. V. 56, № 12. P. 1445–1460.
  DOI: 10.1007/s11182-014-0198-6.
- *Noskov V. Ya., Ignatkov K. A.* About applicability of quasi-static method of autodyne systems analysis // Radioelectronics and Communications Systems. 2014. V. 57, № 3. P. 139–148.
  DOI: 10.3103/S0735272714030054.
- *Noskov V. Ya.* Analysis of the Impact of Noise on the Characteristics of Autodyne Sensors of Vibrations and Small Displacements // Measurement Techniques. (Springer, New York). 2014 (December). V. 57, № 9. P. 1065–1072.
  DOI: 10.1007/s11018-014-0581-2.
- *Noskov V. Ya.* A Double-diode autodyne transceiver // Instruments and Experimental Techniques. 2015. V. 58, № 3. P. 505–509.
  DOI: 10.1134/S0020441215030240

PARALLEL ALGORITHMS FOR SOLVING THE GEOPHYSICAL PROBLEMS ON MULTIPROCESSOR COMPUTING SYSTEMS

Department of Numerical Methods and Equations of Mathematical Physics

The program is focused on training specialists in fast and stable parallel algorithms construction for solving the linear systems of equations in inverse geophysical problems and development of software packages for efficient computing on parallel computing systems.

Dr. Elena Akimova
Professor, Doctor of Physical and Mathematical Sciences

aen15@yandex.ru

Research interests:

- Parallel algorithms for solving linear systems with block matrices on multi-core and graphic processors.
- Algorithms for solving inverse geophysical problems on parallel computing systems.

Main publications:

- *Akimova E. N., Belousov D. V.* Parallel algorithms for solving linear systems with block-tridiagonal matrices on multi-core CPU with GPU // Journal of Computational Science. 2012. V. 3. Is. 6. P. 445–449.
- *Akimova E. N.* Parallel Matrix Sweep Algorithm for Solving Linear Systems with Block-Fivediagonal Matrices // Book Series: AIP Conference Proceedings. 2015. V. 1648. Article Number: UNSP 850028.
- *Akimova E. N., Belousov D. V., Misilov V. E.* Algorithms for solving inverse geophysical problems on parallel computing systems // Numerical Analysis and Applications. 2013. V. 6. Is. 2. P. 98–110.
- *Akimova E. N., Martyshko P. S., Misilov V. E.* Algorithms for solving the structural gravity problem in a multilayer medium // Doklady Earth Sciences. 2013. V. 453. Is. 2. P. 1278–1281.

MATHEMATICAL MODELING, NUMERICAL METHODS, AND SOFTWARE COMPLEXES

Department of Numerical Methods and Equations of Mathematical Physics

The program is focused on training specialists in fast and stable parallel algorithms construction for solving the linear systems of equations in inverse geophysical problems and development of software packages for efficient computing on parallel computing systems.

Dr. Peter Martyshko
Corresponding member of Russian Academy of Science, Professor, Doctor of Physical and Mathematical Sciences

Research interests:

- Theory and Digital Algorithms for Inverse Problem of Math Physics.
- Applied Computational Electromagnetics.

Main publications:

- Study of the Anomalous Magnetic Field Structure in the Ural Region Using Parallel Algorithms Corresponding Member of the RAS P. S. Martyshko, N. V. Fedorova, and D. V. Gemaidinov // Doklady Earth Sciences. 2012. V. 446. Part 1, P. 1102–1104. DOI: 10.1134/S1028334X12090127
- Solution of the Gravimetric Inverse Problem Using Multidimensional Grids. Corresponding Member of the RAS P. S. Martyshko, I. V. Ladovskii, and D. D. Byzov. Doklady Earth Sciences. 2013. V. 450. Part 2. P. 666–671. DOI: 10.1134/S1028334X13060172
- Solving the Structural Inverse Problem of Magnetic Prospecting with Respect to Demagnetization for a Two–Layer Medium Model. Corresponding Member of the RAS P. S. Martyshko, D. D. Byzov, and M. P. Martyshko // Doklady Earth Sciences. 2013. V. 453. Part 2. P. 1264–1268. DOI: 10.1134/S1028334X1312012X
- *Akimova E. N., Martyshko P. S., Misilov V. E.* Algorithms for solving the structural gravity problem in a multilayer medium // Doklady Earth Sciences. 2013. V. 453. Part 2. P. 1278–1281. DOI: 10.1134/S1028334X13120180

SYSTEM ANALYSIS AND MODELING

Department of Information Technology

The program is focused on training specialists in effective experimental methods for research systems associated with carrying out fundamental and applied research in the field of information technology of man and machines.

The main research directions are:

- Business processes.
- System analysis.
- Decision making.
- Multi agents systems.
- Simulation.
- Software engineering.

Dr. Konstantin Aksyonov
Head of Department,
Assistant Professor, PhD.

wiper99@mail.ru

Research interests:

- The decision support of business processes, logistic and manufacturing based on system analysis, simulation and intelligent systems.

Main publications:

- *Konstantin Aksyonov, Eugene Bykov, Leonid Dorosinskiy, Elena Smoliy and Olga Aksyonova* (2011). Decision Support based on Multi-Agent Simulation Algorithms with Resource Conversion Processes Apparatus Application, Multi-Agent Systems – Modeling, Interactions, Simulations and Case Studies, Faisal Alkhateeb, Eslam Al Maghayreh and Iyad Abu Doush (Ed.). HTTP://www.intechopen.com/articles/show/title/decision-support-based-on-multi-agent-simulation-algorithms-with-resource-conversion-processes-appar pp. 301-326
- *Aksyonov K., Bykov E., Aksyonova O., Goncharova N., Nevolina A.* Real-time simulation modeling of logistics in metallurgical production, Proceedings of the 5th IASTED International Conference on Modelling, Simulation and Identification (MSI 2014). July 16–18, 2014. Banff, Canada. P. 30–37.

INSTITUTE OF MATERIAL SCIENCE AND METALLURGY

The Institute of Material Science and Metallurgy is a multi-discipline academic unit. We train specialists in the fields of Material Science, Metallurgy, Construction Engineering, Standardization, Information Systems, and Design of Metallurgical Enterprises.

The Institute has at its disposal a modern laboratory complex in the town of Verkhnyaya Pyshma; affiliated department of metallurgy has been established in the UMMC Corporate University. Vast infrastructure related to material studies and specialized laboratories with all the necessary computer equipment allow maintaining the highest and the most up-to-date level of teaching and research.

There is a strong demand for the Institute's graduates in the labour market. Specialists in material studies and metallurgy find employment almost in all spheres of economy including ferrous and non-ferrous metallurgy, defence industry, aircraft and space industries, machine building, foundry and forging.

We support all our undergraduate students to continue their studies within the frames of the Institute's Master and Doctoral Programs.

All departments of the Institute actively participate in research activities and open up wide opportunities for the students. Start your research career at the Institute of Material Science and Metallurgy!

Dr. Viktor Maltsev,
Director of the Institute

ABOUT THE INSTITUTE

Ural Federal University

named after the first President of Russia B.N.Yeltsin

Institute of Material Science and Metallurgy

The Institute of Material Science and Metallurgy is the main platform in the Ural region for training engineers and researchers in the fields of metallurgy, production of a wide range of construction materials, as well as material science of advanced metallic and non-metallic materials.

Collaboration with industrial companies helped to develop the up-to-date research and production facilities corresponding to world standards. In 2012, the Institute of Material Science and Metallurgy was the first (and the only one) of UrFU Institutes to pass the international quality management system certification of the system ISO 9001-2008.

The Institute of Material Science and Metallurgy was established on the basis of two faculties – the Faculty of Metallurgy and the Faculty of Construction Material Science. This merger allowed increasing the quality of training and bringing the educational programs to a new level due to combining the unique expertise of two faculties and integrating the laboratory and methodological base.

DOCTORAL STUDIES AT THE IMSM

The Institute of Material Science and Metallurgy offers Doctoral Programs in the following fields of study:

- Chemical Sciences.
- Computer Science and Engineering.
- Chemical Engineering.
- Materials Technology.
- Management of Engineering Systems.

We offer:

- 3 or 4 year Doctoral Programs offering an option of defending a Candidate of Science or a PhD thesis.
- Accommodation in a University dormitory.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Russian language courses.

In this brochure you will find a brief description of the Doctoral Programs, alongside with the information about the thesis advisors.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian (B2).
- Interview.

For further information, please contact:

Dr. Arcady Finkelstein,
Professor
avinkel@mail.ru

MATHEMATICAL MODELING, NUMERICAL METHODS AND COMPLEXES OF PROGRAMS

Department of Thermal Physics and Computer Science in Metallurgy

The program focuses on mathematical modeling of thermophysical processes in metallurgy.

Dr. Vladimir Shvydkii
Honored Worker of Higher Education of Russia, Professor, Doctor of Technical Sciences

vshvit@isnet.ru

Research interests:

- The development of the theory of heat and mass transfer in relation to pyrometallurgical technologies, mathematical modeling of thermophysical processes in metallurgy.

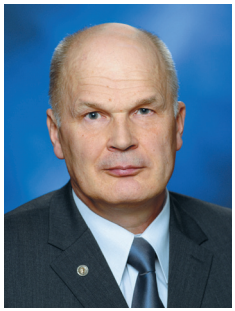
Main publications:

- *Dmitrieva E. G., Shvydkii V. S., Peshkin D. S., Bratygin E. V.* Improved calculation of the heat-transfer coefficient in a bed of iron-ore pellets // Steel in Translation. 2015. V. 44, № 9. P. 656–659. DOI: 10.3103/S0967091214090058
- *Bokovikov B. A., Bragin V. V., Shvydkii V. S.* Role of the thermal-inertia zone in conveyer roasting machines // Steel in Translation. 2014. V. 44, № 8. P. 595–601. DOI: 10.3103/S096709121408004X
- *Novokreshchenov S. A., Shvydkii V. S., Zhukov V. P., Ovchinnikov Y. N., Cheremisin D. D.* Mathematical modeling of the hydrodynamics of the bubble mode during the bottom blowing of the ladle furnace: Report III // Russian Journal of Non-Ferrous Metals. 2013. V. 54, № 6. P. 489–492. DOI: 10.3103/S1067821213060205

MATHEMATICAL MODELING, NUMERICAL METHODS AND COMPLEXES OF PROGRAMS

Department of Thermal Physics and Computer Science in Metallurgy

The program focuses on mathematical modeling of blast furnace process.



Dr. Nikolai Spirin
Honored Worker of Higher Education of Russia, Professor, D. Sc. (Engineering), Doctor of Technical Sciences, Head of Department of Thermal Physics and Computer Science in Metallurgy

n.a.spirin@urfu.ru

Research interests:

- Investigation of processes of heat and mass transfer and gas dynamics of heterophase environment in high temperature units and development on this basis new information-modeling systems of technological processes in metallurgy.
- Mathematical modeling of blast furnace process.

Main publications:

- *Spirin N., Shvidkiy V., Yaroshenko Y., Gordon Y.* The use of combined-blast is the main way to improve the energy efficiency of blast furnaces // WIT Transactions on Ecology and the Environment. 2014. 190. V. 1. P. 467–478.
- DOI: 10.2495/EQ140451
- *Shchipanov K. A., Spirin N. A., Burykin A. A., Kosachenko I. E., Onorin O. P.* Software for the selection of blast-furnace batch // Steel in Translation. 2015. V. 45, № 2. P. 125–129.
- DOI: 10.3103/S0967091215020151
- *Yur'ev B. P., Spirin N. A.* Thermophysical properties of limestone and lime on heating // Steel in Translation. 2012. V. 42, № 4. P. 308–311.
- DOI: 10.3103/S0967091212040195
- *Yur'ev B. P., Spirin N. A.* Thermophysical properties of slag-forming mixtures // Steel in Translation. 2011. V. 41, № 6. P. 475–479.
- DOI: 10.3103/S0967091211060192
- *Yur'ev B. P., Spirin N. A.* Oxidation of iron-ore pellets // Steel in Translation. 2011. V. 41, № 5. P. 400-403.
- DOI: 10.3103/S0967091211050202

AUTOMATION AND MANAGEMENT OF TECHNOLOGICAL PROCESSES AND MANUFACTURES (IN DIFFERENT INDUSTRIES)

Department of Thermal Physics and Computer Science in Metallurgy

The program focuses on algorithms and software computer models of decision support systems in the blast furnace.

Dr. Vladislav Lavrov
Professor, Doctor of Technical Sciences

v.v.lavrov@urfu.ru

Research interests:

- Development of algorithms and software computer models of decision support systems in the blast furnace.

Main publications:

- *Lavrov V. V., Spirin N. A., Burykin A. A., Krasnobaev A. V., Rybolovlev V. Y.* Simulation of heat-transfer processes and assessment of the viscoplastic parameters of iron ore in blast furnaces // Steel in Translation. 2013. V. 43, № 4. P. 171–174.
  DOI: 10.3103/S0967091213040086
- *Onorin O. P., Spirin N. A., Lavrov V. V., Kosachenko I. E., Rybolovlev V. Y.* Assessing the shape of the viscoplastic iron-ore zone in a blast furnace // Steel in Translation. 2013. V. 43, № 6. P. 335–340.
  DOI: 10.3103/S0967091213060132
- *Spirin N. A., Lavrov V. V., Burykin A. A., Krasnobaev A. V., Kosachenko I. E.* Complex of model systems for supporting decisions made in managing blast-furnace smelting technology // Metallurgist. 2011. V. 54, № 9–10. P. 566–569.
  DOI: 10.1007/s11015-011-9340-7
- *Lavrov V. V., Spirin N. A., Burykin A. A., Krasnobaev A. V.* Creation of software for blast-furnace workstations on the basis of up-to-date information technology // Steel in Translation, 2010. V. 40, № 1. P. 31–34.
  DOI: 10.3103/S0967091210010080
- *Lavrov V. V., Babin I. A., Spirin N. A.* Selecting the optimal natural-gas and oxygen distribution in blast furnaces by means of a model // Steel in Translation. 2007, V. 37, № 12. P. 998–1001.
  DOI: 10.3103/S0967091207120078

METALLURGY OF FERROUS, NON-FERROUS AND RARE METALS

Department of Thermal Physics and Computer Science in Metallurgy»

Department of Thermal Physics and Computer Science in Metallurgy.
The program's aim is the development of new and the update of the existing designs of furnaces for stock heating.

Dr. Gennady Druzhinin
Chairman of the Board of Directors and Director of Science and Technology of the Scientific-Research Institute of Metallurgical Heat Engineering (JSC "VNIIMT"), winner of Prize of the Council of Ministers of the USSR, Honored Metallurgist of Russia, Professor, Doctor of Technical Sciences

aup@vniimt.ru

Research interests:

- Reheating furnaces.
- Furnaces with protective atmosphere and gas treatment units.
- Reheating, heat-treatment and drying furnaces with convection heat transfer.
- Pellet production.
- Sintering.
- Lime production.

Main publications:

- *Druzhinin G. M., Ashikhmin A. A., Maslov P. V., Loshkarev N. B., Galkin S. A.* Furnace with a hybrid heating system // Steel in Translation. 2015. V. 45, № 3. P. 216–220.
  DOI: 10.3103/S0967091215030055
- *Druzhinin G. M., Samoilovich Y. A., Popov E. V.* Scale formation and metal loss in unplanned furnace downtime // Steel in Translation. 2015. V. 44, № 9. P. 684–687.
  DOI: 10.3103/S096709121409006X
- *Druzhinin G. M., Samoilovich Y. A., Popov E. V.* Reducing the thermal inhomogeneity of massive steel slabs in continuous furnaces // Steel in Translation. 2013. V. 43, № 7. P. 419–423.
  DOI: 10.3103/S096709121307005X
- *Druzhinin G. M., Loshkarev N. B., Ashikhmin A. A., Nelyubin S. A., Korobeinikov A. V.* Efficiency of regenerative heating in furnaces // Steel in Translation. 2010. V. 40, № 3. P. 277–280.
  DOI: 10.3103/S0967091210030198

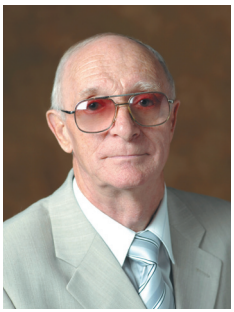
Entry requirements:

- English: Intermediate.

METALLURGY OF FERROUS METALS

Department of Thermal Physics and Computer Science in Metallurgy

The program focuses on the development of resource and energy saving, environmentally friendly constructions and modes of operation of the heating and heat treatment furnaces.



Dr. Michael Kazyaev
Professor, Candidate of Technical Sciences

Research interests:

- Development of resource and energy saving, environmentally friendly constructions and modes of operation of the heating and heat treatment furnaces.

Main publications:

- *Spitchenko D. I., Vokhmyakov A. M., Kazyaev M. D., Kiselev E. V., Kazyaev D. M.* Continuous walking beam furnace for heating of copper and copper-alloy ingots // Tsvetnye Metally. 2014. № 10. P. 83–87.
- *Vokhmyakov A. M., Kazyaev M. D., Arseev B. N., Kazyaev D. M., Ryaposov A. I.* Modernization of heating furnaces // Steel in Translation. 2009. V. 39, № 12, P. 1064-1067.
- DOI: 10.3103/S0967091209120067
- *Gushchin S. N., Kazyaev M. D., Arseev B. N., Kazyaev D. M.* A plant for high-speed melting of basalt rocks // Refractories and Industrial Ceramics. 2009. V. 50, № 2. P. 112–113.
- DOI: 10.1007/s11148-009-9157-0
- *Kazyaev M. D., Kiselev E. V., Loshkarev N. B., Markin V. P., Vinokurov V. V.* Improvement in design of soaking pits by means of physical modeling // Stal', 2002. № 5. P. 74–76.
- *Kazyaev M. D., Loshkarev N. B., Markin V. P., Kiselev E. V.* Improving continuous furnaces by means of physical modeling // Steel in Translation. 2000. V. 30, № 9. P. 79–82.

METALLURGY OF FERROUS, NON-FERROUS AND RARE METALS

Department of Thermal Physics and Computer Science in Metallurgy

The program focuses on the design versions of cooper coolers and water-cooled steel boxes of blast furnace for ferrous and non-ferrous metallurgy.

Dr. Lik Zaynullin
Director General of Scientific-Research Institute of Metallurgical Heat Engineering (VNIIMT OJSC), Honored Metallurgist of Russia, Professor, Doctor of Engineering Science

aup@vniimt.ru

Research interests:

Development of energy efficient thermal generating units including:

- Near-furnace slag granulating units.
- Design versions of cooper coolers and water-cooled steel boxes of blast furnace for ferrous and non-ferrous metallurgy.
- Methods and devices for metallic coating application and single-stage production of metal from powdery oxide-containing materials.
- Methods and devices for drying of wet bulk materials.
- Methods of utilization of heat from metallurgical slag and devices for introduction of these methods.

Main publications:

- *Zainullin L. A., Spirin N. A., Kalganov M. V., Kalganov D. V.* Using centrifugal fans in the cooling of convective furnaces // Steel in Translation. 2015. V. 45, № 3. P. 224–225.
  DOI: 10.3103/S096709121503016X
- *Zainullin L. A., Kalganov M. V., Kalganov D. V., Fatkhutdinov A. R., Pugin A. I.* Furnace electric heaters with radiant-convective heat transfer // Steel in Translation. 2015. V. 45, № 3. P. 221–223.
  DOI: 10.3103/S0967091215030158
- *Zainullin L. A., Loshkarev N. B., Kalganov M. V., Kalganov D. V.* Centrifugal fans for convective furnaces with periodic reversal of hot-gas motion // Steel in Translation. 2014. V. 44, № 11. P. 851–853.
  DOI: 10.3103/S0967091214110187

Entry requirements:

- English – B2.

PHYSICAL CHEMISTRY

Department of Theory of Metallurgical Processes

The program focuses on physical and chemical processes in nanotechnologies.

Dr. Valerij Polukhin
Prof., Honored Scientist of the Russian Federation

Research interests:

- Computer nanotechnology.
- Graphene reinforced layered transition metal based functional composites.
- Quenched amorphous and nano-crystalline materials.
- Methods of membrane hydrogen purification.

Main publications:

- *Galashev A. E., Polukhin V. A., Izmodenov I. A., Rakhmanova O. R.* Molecular dynamics simulation of the physicochemical properties of silicon nanoparticles containing 73 atoms // Glass Physics and Chemistry. 2007. V. 33, № 1. P. 86–95. DOI: 10.1134/S1087659607010130
- *Galashev A. E., Polukhin V. A., Izmodenov I. A., Rakhmanova O. R.* Simulation of noncrystalline silicon nanoparticles: A computer experiment // Glass Physics and Chemistry. 2006. V. 32, № 1. P. 99–105. DOI: 10.1134/S1087659606010135
- *Galashev A. E., Polukhin V. A.* Computer simulation of thin nickel films on single-layer graphene // Physics of the Solid State. 2013. V. 55, № 11. P. 2368–2373. DOI: 10.1134/S1063783413110085
- *Galashev A. E., Polukhin V. A.* Computer study of the physical properties of a copper film on a heated graphene surface // Physics of the Solid State. 2013. V. 55, № 8. P. 1733–1738. DOI: 10.1134/S1063783413080118
- *Polukhin V. A., Kurbanova E. D., Galashev A. E.* Effect of the character of the (Ni, Pd) cluster/graphene interatomic bonds on the thermosize effects and structural-isomeric transitions // Russian Metallurgy (Metally). 2012. № 8. P. 696–704. DOI: 10.1134/S0036029512080083

Entry requirements:

- English – Upper Intermediate.

METALLURGY OF TECHNOGENIC AND SECONDARY RESOURCES

Metallurgy of Non-Ferrous Metals Department

The fields studied in this program are technologies of hydrometallurgical processing of primary and secondary (wastes)copper-, zinc- and lead-containing materials.

Dr. Sergey Mamyachenkov
Professor

Research interests:

- Theory (thermodynamics and kinetics) hydrometallurgical and electrochemical processes.
- Technology of hydrometallurgical processing of primary and secondary (wastes) copper-, zinc- and lead-containing materials.

Main publications:

- *Panshin A. M., Anisimova O. S., Mamyachenkov S. V., Karelov S. V.* Phase composition of the Waelz process products of zinc-bearing dusts of ferrous metallurgy // Tsvetnye Metally. 2013. № 8. P. 51–54.
- *Tsogtkhankhai D., Mamyachenkov S. V., Anisimova O. S., Naboichenko S. S.* Thermodynamics of reactions during nitric acid leaching of minerals of a copper concentrate // Russian Journal of Non-Ferrous Metals. 2011. V. 52, № 2. P. 135–139.
  DOI: 10.3103/S106782121102012X
- *Rogozhnikov D. A., Mamyachenkov S. V., Karelov S. V., Anisimova O. S.* Nitric acid leaching of polymetallic middlings of concentration // Russian Journal of Non-Ferrous Metals. 2013. V. 54, № 6. P. 440–442.
  DOI: 10.3103/S1067821213060242
- *Rogozhnikov D. A., Karelov S. V., Mamyachenkov S. V., Anisimova O. S.* Technology for the hydrometallurgical processing of a complex multicomponent sulfide-based raw material // Metallurgist. 2013. V. 57, № 3-4. P. 247–250.
  DOI: 10.1007/s11015-013-9720-2
- *Nechvoglod O. V., Selivanov E. N., Mamyachenkov S. V.* Effect of structure on the electrochemical oxidation rate of copper and nickel sulfides // Defect and Diffusion Forum. 2012. V. 326–328. P. 383–387.
  DOI: 10.4028/www.scientific.net/DDF.326-328.383

METALLOGRAPHY AND HEAT TREATMENT OF METALS AND ALLOYS

Department of Material Science

The program focuses on the study of inelastic properties of high strength steels and alloys.

Dr. Liudmila Maltseva
Professor

Research interests:

- Development of compositions and strengthening technology of high strength steels and alloys of carbon and carbon-free maraging, austenitic and austenitic-ferritic steels with special physical and mechanical properties for instrument, special mechanical engineering and medicine. The study of inelastic properties of high strength steels and alloys.

Main publications:

- *Mal'tseva L. A., Mitropol'skaya S. Yu.* Effect of tensile deformation on austenitic Cr-Ni-steel structure and magnetic properties // Metal Science and Heat Treatment. 2013. V. 55, № 5-6. P. 328–334. DOI: 10.1007/s11041-013-9629-1
- *Mal'tseva L. A.* Structure and strength properties of a corrosion-resistant austenitic-ferritic medical steel after thermoplastic deformation // Russian Metallurgy (Metally). 2011. № 4. P. 307–313. DOI: 10.1134/S0036029511040112
- *Mal'tseva L. A., Arkhangel'skaya A. A., Kataeva N. V., Mal'tseva T. V., Ozerets N. N.* Special features of hardening of austenitic-ferritic steel after thermoplastic treatment // Metal Science and Heat Treatment. 2010. V. 52, № 1–2. P. 39–45. DOI: 10.1007/s11041-010-9227-4
- *Mal'tseva L. A., Zavalishin V. A., Mikhailov S. B., Mal'Tseva T. V., Sharapova V. A.* Properties of metastable steel 03Kh14N11K5M2YuT after thermoplastic treatment // Metal Science and Heat Treatment. 2009. V. 51, № 11–12. P. 557–562. DOI: 10.1007/s11041-010-9210-0

Entry requirements:

- English – Intermediate.

METALLURGY OF FERROUS, NON-FERROUS AND RARE METALS

Department of Ferrous Metallurgy

The aim of the program is the blast furnace technology improvement on the basis of technical analysis and technological experiments.

Dr. Sergey Zagainov
Professor, Head of Department of Ferrous Metallurgy

Research interests:

- Blast furnace technology improvement on the basis of technical analysis and technological experiments.
- Energy efficient technology of blast-furnace smelting with implementation of pulverized coal injection.

Main publications:

- *Zagainov S., Filatov S., Gordon Y., Sobianina O.* Technological solutions for intensive production of low silicon hot metal in blast furnace processing vanadium containing titania-magnetite // AISTech – Iron and Steel Technology Conference Proceedings. 2013. V. 1. P. 527–536.
- *Sobyanina O. N., Filatov S. V., Zagainov S. A.* Analysis of titanium reduction in a blast furnace // Steel in Translation. 2012. V. 42, № 3. P. 246–248. DOI: 10.3103/S0967091212030163
- *Zagainov S. A., Onorin O. P., Spirin N. A., Yaroshenko Yu. G.* Mathematical model of the blast-furnace process // Steel in Translation. 2003. V. 33, № 12. P. 1–5.
- *Zagainov S. A., Onorin O. P., Gileva L. Yu., Volkov D. N., Tleugobulov B. S.* Software for flexible blast-furnace operation // Steel in Translation. 2000. V. 30, № 9. P. 9–11.

Entry requirements:

- English – Upper Intermediate.

MATERIAL SCIENCE (MACHINE-BUILDING, METALLURGY)

Department of Material Science and Metallurgy

The program focuses on the mechanical behavior of steels and alloys.

Dr. Sergei Gladkovsky
Tech. Sci., Prof.

Research interests:

- Mechanical behavior of steels and alloys.
- Structural materials fracture toughness.
- Layered metal matrix composites.

Main publications:

- *Safarov I. M., Korznikov A. V., Galeev R. M., Gladkovskii S. V., Borodin E. M., Pyshmintsev I. Y.* Strength and impact toughness of low-carbon steel with fibrous ultrafine-grained structure // Physics of Metals and Metallography. 2014. V. 115, № 3. P. 295–302.
  DOI: 10.1134/S0031918X14030107
- *Gladkovskii S. V., Trunina T. A., Kokovikhin E. A., Kamantsev I. S., Gorbunov A. V.* Structural steel-aluminum sandwich composites based on low-carbon steel 006/IF // Metal Science and Heat Treatment. 2013. V. 55, № 1–2. P. 3–7.
  DOI: 10.1007/s11041-013-9569-9
- *Safarov I. M., Korznikov A. V., Sergeev S. N., Gladkovskii S. V., Borodin E. M.* Effect of submicrocrystalline state on strength and impact toughness of low-carbon 12GBA steel // Physics of Metals and Metallography. 2012. V. 113, № 10. P. 1001–1006.
  DOI: 10.1134/S0031918X12100109

Entry requirements:

- English – Upper Intermediate.

METALLOGRAPHY AND HEAT TREATMENT OF METALS AND ALLOYS

Department of Material Science

The program focuses on the research of the structure and mechanical and corrosion properties of corrosion-resistant steels.

Dr. Vera Berezovskaya
Professor, Doctor of Science,
Associate Professor,
Member of New York Academy of Sciences

Research interests:

- High Nitrogen Steels.
- High Manganese Steels.

Main publications:

- *Berezovskaya V. V., Savrai R. A., Merkushkin E. A., Makarov A. V.* Structure and mechanical and corrosion properties of new high-nitrogen Cr-Mn steels containing molybdenum // Russian Metallurgy (Metally). 2012. № 5. P. 380–388. DOI: 10.1134/S0036029512050059
- *Berezovskaya V. V., Kostina M. V., Blinov E. V., Bobrova V. E., Bannykh I. O.* Effect of heat treatment on the structure of high-nitrogen austenitic corrosion-resistant 04Kh22AG17N8M2F and 07Kh20AG9N8MF steels // Russian Metallurgy (Metally) 2009. № 2. P. 146–153. DOI: 10.1134/S0036029509020086
- *Berezovskaya V. V., Kostina M. V., Blinov E. V., Bobrova V. E., Mel'nik V. P.* Corrosion properties of austenitic Cr-Mn-Ni-N steels with various manganese concentrations // Russian Metallurgy (Metally). 2008. № 31. P. 29–33. DOI: 10.1134/S0036029508010060
- *Bannykh O. A., Blinov V. M., Berezovskaya V. V., (...), Golyakov I. V., Trushin I. S.* Effect of the γ → α mtensite tnsformation in Fe-Cr-N aloys on teir sress-crrosion cacking // Russian Metallurgy (Metally). 2005. № 4. 310–314.
- *Berezovskaya V. V., Khadyev M. S., Merkushkin E. A., Sokolovskaya Y. A.* Influence of deformation on the structure and mechanical and corrosion properties of high-nitrogen austenitic 07Kh16AG13M3 steel // Russian Metallurgy (Metally). 2013, № 11. P. 855–862. DOI: 10.1134/S0036029513110049

Entry requirements:

- English – B1.

PHYSICAL CHEMISTRY

Department of Metallurgy

The program focuses on the study of physical and chemical phenomena in metallurgical processes.

Dr. Anatoly Vatolin
Professor

Research interests:

- Physical chemistry of metallurgical processes.
- Research of electrochemical interaction of metal with oxidic fusion.
- Research of electrochemical interaction of metal with oxidic fusion.
- Research of the mechanism, kinetics and thermodynamics of the major metallurgical reactions on border of the melted oxides with liquid and solid metals.
- Slowness of superficial diffusion in high-temperature systems.
- Structure and transport properties of liquid slags and regularities of their structural relaxation.

Main publications:

- *Koptelova N. Yu., Sotnikov A. I., Vatolin A. N.* Effect of microinhomogeneity of potassium borosilicate melts on their transport properties // Rasplavy. 2002. № 6. P. 23–29.
- *Vatolin A. N.* The kinetics of anodic processes at the platinum-borosilicate melt boundary // Contemporary Engineering Sciences. 2014. 7 (5–8). P. 375–377. DOI: 10.12988/ces.2014.4215
- *Vatolin A. N.* Diffusion processes in the liquid borosilicate with nonequilibrium structure // Contemporary Engineering Sciences. 2014. 7 (25–28). P. 1463–1466. DOI: 10.12988/ces.2014.49179

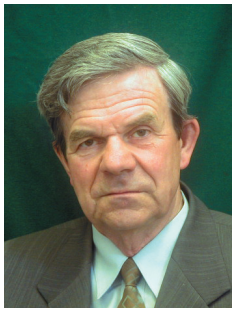
Entry requirements:

- English –Intermediate.

METAL FORMING

Department of Metal Forming

The program focuses on the research of technological processes of bar rolling of steels.



Dr. Vladislav Shilov
Dr. Sci. (Eng.), Professor of the Department of Metal Forming

omd@urfu.ru

Research interests:

- Optimization of technological processes of bar rolling based on mathematical methods and computers.

Main publications:

- *Shilov V. A., Shvarts D. L., Litvinov R. A.* Shaping of metal when rolling rails in universal grooves // Steel in Translation. 2008. V. 38, № 3. P. 214–216.
- DOI: 10.3103/S0967091208030066
- *Shilov V. A., Myasnikova M. V.* Working-cell elastic deformation and rolling accuracy in multistrand wire-rod mills // Steel in Translation. 2000. V. 30, № 9. P. 40–43.
- *Nepryakhin S. O., Shilov V. A., Shvarts D. L.* Metal flow and forces when rolling I beams in universal grooves // Steel in Translation. 2014. V. 44, № 11. P. 842–846.
- DOI: 10.3103/S0967091214110138
- *Davaasambuu Ch., Shilov V. A., Mikhailenko A. M.* Influence of rolling parameters on the mechanical properties of reinforced steel // Steel in Translation. 2003. V. 33, № 10. V. 48–49.
-

Entry requirements:

- German – Intermediate.

METAL FORMING

Department of Metal Forming

The program focuses on the research of deformation processes of porous and metallic materials.

Dr. Yuri Loginov
Professor

Research interests:

- Deformation of porous materials.
- Deformation of non-ferrous metals.

Main publications:

- *Loginov Y. N., Demakov S. L., Illarionov A. G., Karabanalov M. S.* Evolution of defects in the production of capillary copper tubes // Journal of Materials Processing Technology. 2015. 224. 14400. P. 80–88.
  DOI: 10.1016/j.jmatprotec.2015.04.029
- *Demakov S. L., Loginov Yu. N., Illarionov A. G., Ivanova M. A., Karabanalov M. S.* Effect of annealing temperature on the texture of copper wire // Physics of Metals and Metallography. 2012. V. 113, № 7. P. 681–686.
  DOI: 10.1134/S0031918X12070046
- *Loginov Y. N., Bourkine S. P., Babailov N. A.* Cinematics and volume deformations during roll-press briquetting // Journal of Materials Processing Technology. 2001. V. 118, № 1-3. P. 151–157.
  DOI: 10.1016/S0924-0136(01)00880-9
- *Loginov Yu. N., Yermakov A. V., Grohovskaya L. G., Studenok G. I.* Annealing characteristics and srain resistance of 99.93 wt.% platinum // Platinum Metals Review. 2007. V. 51, № 4. P. 178–184.
  DOI: 10.1595/147106707X237708
- *Loginov Yu. N., Demakov S. L., Illarionov A. G., Ivanova M. A., Romanov V. A.* Structural condition of copper wire rod, obtained during the continuous casting – Rolling process // Tsvetnye Metally. 2013. № 8. P. 87–92.

PROCESSES AND MACHINES OF CHEMICAL TECHNOLOGY

Department of Construction Materials

The program focuses on physical chemistry and technology of production of mineral binders.

Dr. Fedor Kapustin
Professor

Research interests:

- Physical chemistry and technology of production of mineral binders.
- Utilization of tecnogenic waste in the production of construction materials.

Main publications:

- *Domanskaya I., Kapustin F., Ufimtsev V., Oleynik V.* The granulating process as an effective way to increase demand for high calcium fly ash of a thermal power plant // WIT Transactions on Ecology and the Environment. 2014, 190. V. 2. P. 1129–1136.
  DOI: 10.2495/EQ141052
- *Davydov S. Ya., Kapustin F. L., Kashcheev I. D., Sychev S. N., Dmitrenko D. D.* Transport and storage equipment with pneumatic loading // Refractories and Industrial Ceramics. 2010. V. 51, № 3. P. 161–166.
  DOI: 10.1007/s11148-010-9281-x
- *Davydov S. Ya., Kapustin F. L., Kashcheev I. D., Ustinova A. G.* Studies on managing flexible containers // Refractories and Industrial Ceramics. 2007. V. 48, № 1. P. 40–42.
  DOI: 10.1007/s11148-007-0022-8

Entry requirements:

- English – Intermediate.

METALLOGRAPHY AND HEAT TREATMENT OF METALS AND ALLOYS

Department of Heat Treatment and Physics of Metal

The program focuses on the research of phase and structure transformation in metals and alloys.

Dr. Artemy Popov
Professor, Head of Department of Heat Treatment and Physics of Metal

a.a.popov@urfu.ru

Research interests:

- Heat treatment and thermomechanical treatment of steels, non-ferrous metals and alloys.

Main publications:

- *Popov A., Rossina N., Popova M.* The effect of alloying on the ordering processes in near-alpha titanium alloys // Materials Science and Engineering A. 2013. V. 564. P. 284–287.
  DOI: 10.1016/j.msea.2012.11.043
- *Popov A. A., Illarionov A. G., Grib S. V., Elkina O. A.* Formation conditions of omega phase in the titanium alloys after quenching // Ti 2011 – Proceedings of the 12th World Conference on Titanium. 2012. V. 1. P. 694–697.
- *Belikov S. V., Zhilyakov A. Y., Popov A. A., Karabanalov M. S., Polovov I. B.* Special Features of Formation of Excess Phases During Aging of Corrosion-Resistant High-Alloy Austenitic Alloys Based on Fe And Ni // Metal Science and Heat Treatment. 2015. V. 56, № 12. P. 637–645.
  DOI: 10.1007/s11041-015-9814-5
- Precipitation of the sigma phase in high-alloy austenitic chromium-nickel-molybdenum alloys // Physics of Metals and Metallography. 2009. V. 108, № 6. P. 586–592.
  DOI: 10.1134/S0031918X09120096
- *Popov A. A., Illarionov A. G., Grib S. V., Karabanalov M. S., Elkina O. A.* Phase and structural transformations in the alloy on the basis of the orthorhombic titanium aluminide // Physics of Metals and Metallography. 2008. V. 106, № 4. P. 399–410.
  DOI: 10.1134/S0031918X08100104

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Ekaterinburg, 2015
UrFU Publishing and Printing Center

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